Scientific American.

A WEEKLY JOURNAL OF PRACTICAL INFORMATION IN ART, SCIENCE, MECHANICS, CHEMISTRY AND MANUFACTURES.

Vol. X.—No. 9. (NEW SERIES.) NEW YORK, FEBRUARY 27, 1864. SINGLE COPIES SIX CENTS. $3 PER ANNUM—IN ADVANCE.

Improved Turret.

The object of the inventor in constructing this turret has been to furnish one which shall be perfectly shot-proof, easily constructed, and without having a bolt necessarily employed in the sheets which compose it. This is effected by making the several sheets or plates with dovetailed grooves and tongues, as shown in the top of the turret, and also in Figs. 2 and 3. A turret thus made can be soon put together, and the parts are also convenient for transportation. As the plates are all rolled to the right size, or nearly so, very little work is required to fit them to each other, and the absence of bolts renders the costly and tedious operation of drilling or punching holes and rimming them afterward altogether unnecessary. It will be seen that as the plates interlock each other they break joint, one course with the other; also that the first and second courses completely bind each other together in one body. The illustration is so clear that little or no explanation is needed to convey an accurate idea of the invention. In Fig. 2 the same principle of constructing the plating is observed, but the formation of the plates themselves is varied a little. There are, n the straight plan, three courses, but there may be any desired number, and the inner plates are simply a double-ended T, in shape, over the ends of which

Fig. 2

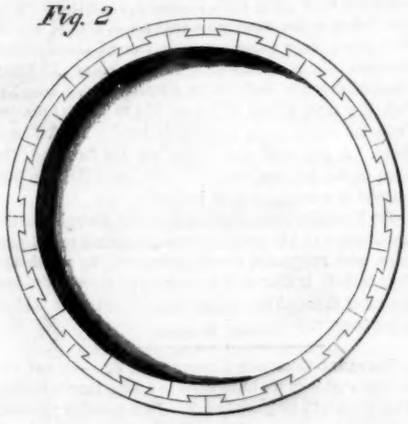
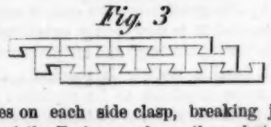
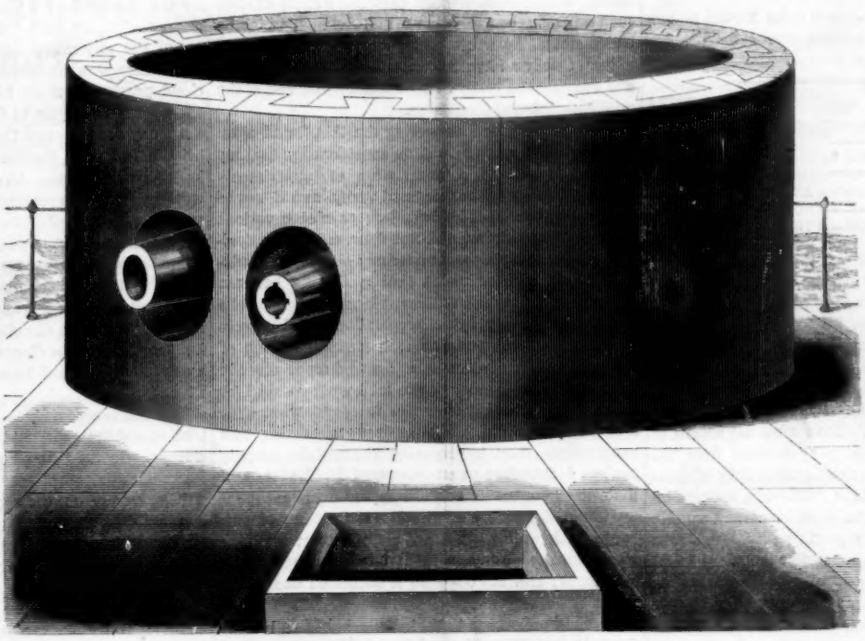


Fig. 3



the courses on each side clasp, breaking joint with the ends of the T-pieces where they abut together, and clamping the whole firmly. This system of plating can be applied to forts, vessels or structures of any kind, requiring iron mail. It can be quickly set up in place, and after having been once filled needs no further adjustment. Those interested in plating ships of war and providing iron mail, would do well to consider this plan.

A patent was granted on this invention, through the Scientific American Patent Agency, on Nov. 24, 1863, to George Snedecor, of No. 10 Walker street, this city. Foreign patents are also pending in European countries through the same agency. For further information address the inventor as above.



SNEDECOR'S "UNION" TURRET.

GREAT GUNS.

Government is determined, it seems, to fully test the practical value of guns of immense caliber. A 20-inch gun was recently cast in Pittsburgh as an experiment, and we here record the results, although we should, with a far higher degree of satisfaction, give place to some account of a 300-pounder which could throw a shot five miles, and do it without bursting at the sixth or seventh round. Better devote the knowledge of ordnance and the force of exploding gunpowder we possess to the construction of a comparatively small but efficient weapon, than to waste it on these huge bombards which cannot, except by mere chance, be made available against iron-clad ships.

It has been generally known for some months that preparations were making at the Fort Pitt Works for the casting of a monster columbiad gun of 20 inches caliber. These preparations were completed on the 4th inst., and the gun cast, an unparalleled feat in the manufacture of iron. The furnaces in which the iron of this gun was melted contained the enormous amount of 40 tuns each, and nearly this quantity was melted on the occasion. The construction of the patterns alone, of the flask and gun, occupied many weeks.

The core barrel used in the manufacture of all guns of Rodman's patent, is a long-fluted cylinder of iron, semicircular at one end and closed at the other by a cap, through which a pipe enters and passes nearly to the bottom of the cylinder. Through this pipe a stream of water is conducted to the bottom of the barrel during the process of casting, and rising around it to within a few inches of the top, is carried off by a waste pipe. This barrel is rather smaller in diameter than the rough bore of the gun, and is prepared for the casting by wrapping it with a layer of hard cord, which is then coated with a peculiar refractory composition. This casting of the barrel "vents" the metal—that is, affords an exit to the gases generated during the casting, which pass along the flutings of the barrel and burn fiercely at the top; the barrel, when coated, is also subjected to the drying oven, before being lifted into the mold. The centering of the core in the mold is a task of extreme delicacy, but with constant practice, the employes in the Works have become so expert as to insure almost perfect accuracy. The barrel is supported at the upper end by a massive tripod, lifting its head some two feet above the upper edge of the flask, and enabling the workmen to observe the rise of metal in the mold. During the operation of casting a constant stream of water pours through the barrel, keeping down its temperature, and cooling the gun from the interior.

THE CASTING.—The labor of many weeks of preparation closed on the 3d inst. The flask was lifted into the pit, closed and luted, and the core barrel fixed in its place. The three furnaces were charged one with 39 tuns and each of the others with 23½ tuns of metal, chiefly Bloomfield, and worth $65 per tun at the furnace. One of the smaller furnaces in the old foundry was also charged with twelve tuns of metal as a reserve in case of accident. From each of the four furnaces lines of open troughs of cast-iron, known as "runners," led to the "pool" or reservoir beside the pit, from which two shorter lines connected with the mold. In molding, two long cylindrical bars are laid beside the pattern, forming, when the flask is closed, a circular opening on each side of the mold, leading to the bottom, and connected with the mold by openings all the way to the top, breaking the fall of the flood of metal before reaching the gun bottom. With each of these openings or "gates" is connected one of the runners from the pool. The furnaces were fired at an early hour on Thursday morning, 4th inst., and everything working most admirably the charges were reduced before twelve o'clock. At twenty minutes past twelve the furnaces were tapped, and three fiery streams of metal poured into the pool and thence into the mold. The reduction of the metal had been

so successfully performed that no difference was perceptible in the character of the iron flowing from the several furnaces. The filling of the mold proceeded with the same success, and at a quarter to one—twenty-five minutes after the furnaces were tapped, the mold was filled and they were stopped off—170,000 lbs. of metal having in the meantime passed through the pool—nearly 7,000 lbs. per minute. The operation passed off more successfully than any casting we have heretofore witnessed, no difficulting arising at any stage, notwithstanding the immense weight of iron used.

The monster gun will be reduced in the lathe from a rough weight of 170,000 lbs. to a finished weight, calculated, of 115,000. The whole length from breech to muzzle will be 243·33 inches; length of bore 210 inches. The maximum diameter will be 64 inches, minimum, 34 inches. The solid round 20-inch shot will weigh 1,000 lbs, and the shell about 700 lbs. The charge of powder will vary according to circumstances from 65 to 80 lbs. Some two weeks must elapse before the gun will be lifted from the pit, and many weeks before it will leave the lathe in a partially finished condition, to be chipped, filed and fitted ready for mounting. We presume that the testing will be performed in that vicinity and the gun then brought East to some of our sea-coast forts—probably to our own city.

The lathe in which this gun is to be turned is one of the most massive, we believe, ever constructed—the whole weight being 208,000 lbs.

THE MOST IMPORTANT AMERICAN DISCOVERIES AND INVENTIONS.

No. 1.

THE IDENTITY OF LIGHTNING AND ELECTRICITY.

Franklin.—1752.

The mode in which this great discovery was suggested to Dr. Franklin we give in his own words, extracted from his autobiography:

"In 1746, living then in Boston, I met with Dr. Spence, who was lately arrived from Scotland, and showed me some electric experiments. They were imperfectly performed as he was not very expert; but, being on a subject quite new to me, they equally surprised and pleased me. Soon after my return to Philadelphia, our library company received from Mr. Peter Collinson, Fellow of the Royal Society of London, a present of a glass tube, with some account of the use of it, in making such experiments. I eagerly seized the opportunity of repeating what I had seen in Boston; and, by much practice acquired great readiness in performing those also which we had an account of from England, adding a number of new ones. I say much practice, for my house was continually full, for some time, with persons who came to see those wonders.

"To divide a little this incumbrance among my friends, I caused a number of similar tubes to be blown in our glass-house, with which they furnished themselves, so that we had at length several performers. Among these the principal was Mr. Kinnersley, an ingenious neighbor, who, being out of business, I encouraged him to undertake showing the experiments for money, and drew up for him two lectures, in which the experiments were ranged in such order, and accompanied with explanations in such method, as that the foregoing should comprehend the following. He procured an elegant apparatus for the purpose, in which all the little machines that I had roughly made for myself were neatly formed by instrument-makers. His lectures were well attended, and gave great satisfaction; and after some time he went through the colonies, exhibiting them in every capital town, and picked up some money. In the West India Islands, indeed, it was with difficulty that the experiments could be made, from the general moisture of the air.

"Obliged as we were to Mr. Collinson for the tube, &c., I thought it right he should be informed of our success in using it, and wrote him several letters containing accounts of our experiments. He got them read in the Royal Society, where they were not at first thought worth so much notice as to be printed in their *Transactions*. One paper, which I wrote for Mr. Kinnersley, on the sameness of lightning with electricity, I sent to Mr. Mitchell, an acquaintance of mine, and one of the members also of that society; he wrote me word that it had been read but was laughed at by the connoisseurs. The papers, however, being shown to Dr. Fothergill, he thought them of too much value to be stifled, and advised the printing of them. Mr. Collinson then gave them to Cave for publication in his *Gentleman's Magazine* but he chose to print them separately in a pamphlet, and Dr. Fothergill wrote the preface. Cave, it seems judged rightly for his profession, for by the additions that arrived afterwards, they swelled to a quarto volume, which has had five editions, and cost him nothing for copy-money.

"It was, however, some time before those papers were much taken notice of in England. A copy of them happening to fall into the hands of the Count de Buffon, a philosopher deservedly of great reputation in France, and indeed all over Europe, he prevailed with M. Dubourg to translate them into French; and they were printed at Paris. The publication offended the Abbé Nollet, Preceptor in Natural Philosophy to the Royal Family and an able experimenter, who had formed and published a theory of electricity, which then had the general vogue. He could not at first believe that such a work came from America, and said it must have been fabricated by his enemies at Paris to oppose his system. Afterwards, having been assured that there really existed such a person as Franklin at Philadelphia, which he had doubted, he wrote and published a volume of letters, chiefly addressed to me, defending his theory, and denying the verity of my experiments, and of the positions deduced from them.

"I once purposed answering the Abbé, and actually began the answer; but on consideration that my writings contained a description of experiments which any one might repeat and verify, and if not to be verified, could not be defended; or of observations offered as conjectures, and not delivered dogmatically, thence not laying me under any obligation to defend them; and, reflecting that a dispute between two persons, written in different languages, might be lengthened greatly by mistranslations, and thence misconceptions of one another's meaning—much of one of the Abbé's letters being founded on an error in the translation—I concluded to let my papers shift for themselves; believing it better to spend what time I could spare from public business in making new experiments than in disputing about those already made. I therefore never answered M. Nollet; and the event gave me no cause to repent my silence; for my friend M. Le Roy, of the Royal Academy of Sciences, took up my cause and refuted him; my book was translated into the Italian, German, and Latin languages; and the doctrine it contained was by degrees generally adopted by the philosophers of Europe, in preference to that of the Abbé; so that he lived to see himself the last of his sect, except Monsieur B——, of Paris, his *dernier* and immediate disciple.

"What gave my book the more sudden and general celebrity was the success of one of its proposed experiments, made by Messieurs Dalibard and De Lor at Marly, for drawing lightning from the clouds. This engaged the public attention everywhere. M. De Lor, who had an apparatus for experimental philosophy and lectured in that branch of science, undertook to repeat what he called the 'Philadelphia Experiments;' and, after they were performed before the king and court, all the curious of Paris flocked to see them. I will not swell this narrative with an account of that capital experiment, or of the infinite pleasure I received in the success of a similar one I made soon after with a kite at Philadelphia, as both are to be found in the histories of electricity.

"Dr. Wright, an English physician, when at Paris, wrote to a friend, who was of the Royal Society, an account of the high esteem my experiments were in among the learned abroad, and of their wonder that my writings had been so little noticed in England. The Society on this resumed the consideration of the letters that had been read to them; and the celebrated Dr. Watson drew up a summary account of them, and of all I had afterwards sent to England on the subject; which he accompanied with some praise of the writer. This summary was then printed in their *Transactions;* and some members of the Society in London, particularly the very ingenious Mr. Canton, having verified the experiment of procuring lightning from the clouds by a pointed rod and acquainted them with the success, they soon made me more than amends for the slight with which they had before treated me. Without my having made any application for that honor they chose me a member; and voted, that I should be excused the customary payments, which would have amounted to twenty-five guineas, and ever since have given me their *Transactions* gratis. They also presented me with the gold medal of Sir Godfrey Copley, for the year 1753, the delivery of which was accompanied by a very handsome speech of the president, Lord Macclesfield, wherein I was highly honored."

Dr. Franklin, afterwards, in a letter to a friend in England, gave a full account of his experiment with the kite:—

While he was waiting for the completion of a spire which was being erected in Philadelphia, it occurred to him that he might raise a lightning rod in the air by means of a kite. He accordingly constructed a light cross of cedar wood, which he covered with a large, thin silk handkerchief. Into the upper end of the kite he inserted a pointed wire about a foot in length, and connected this wire with the string which was of hemp. The lower end of the string was terminated by a silk cord, and at the junction of the hemp and silk was attached an iron key. He then waited for the approach of a thunder-shower, and seeing a cloud arising, he took his son with him, and going out of the city raised his kite. For a considerable time there was no manifestation of electricity, the cloud passing over the kite without producing any effect—and he began to despair of success. After a time, however, he saw the fibres of the hemp string bristling out, and, presenting his knuckles to the key, he received a spark. After it began to rain and had wet the string, increasing its conducting power, the sparks came in profusion.

This experiment was made in June 1752, and Franklin was then 46 years of age. Though similar experiments had been made just previously by Dalibard and De Lor, in France, yet as those were made in accordance with directions furnished by Dr. Franklin, the credit of the discovery is fully awarded to him by the most eminent French writers, including De la Rive.

The discovery immediately attracted universal attention and the experiment was repeated throughout Europe. In St. Petersburgh it cost one learned professor his life. Professor Richman was engaged in writing a work on the electricity of the atmosphere, and had erected a lightning-rod on his house. In the forenoon of Aug. 6th, 1753, he was attending a regular meeting of the Academy of Sciences, when he heard distant thunder, and immediately hastened home to observe his rod, taking with him his engraver, Sokolow, to witness the phenomena, so that he might be able to represent them. The lower end of Prof. Richman's rod terminated in a glass jar, and he had attached a light string to the rod to indicate the degree of electrical excitement. The string was standing at 4°, and Prof. Richman was explaining to Mr. Sokolow the extreme danger if it should rise to 45°, when there came a terrible clap of thunder that startled all St. Petersburgh. Professor Richman stooped down to look at his electrometer, when, Mr. Sokolow says, a ball of fire as big as his fist darted from the rod into the professor's head. He fell back dead. A red spot was found on his forehead, the shoe of his left foot was split open, and the skin was burned in a few places on his body.

Dr. Franklin immediately turned his thoughts to the application of his great discovery to some useful purpose, and suggested the lightning-rod, by which the thunderbolt is drawn in silence from the clouds, and the most dreaded of all the forces of nature is robbed of its terrors.

J. SCOTT RUSSELL'S REPORT ON GUN-COTTON.

We take the following extracts from the Report of the Mechanical Section of the British Association, to whom was referred the subject of gun-cotton for military purposes :—

Mr. J. Scott Russell read the Report on the mechanical portion of this question, by which it appears that greater effects are produced by gases generated from gun-cotton than by gases generated from gunpowder, and it was only after long and careful examination that the Committee were able to reconcile this fact with the low temperature at which the mechanical force is obtained. General Von Lenk, of the Austrian Artillery, has discovered the means of giving gun-cotton any velocity of explosion that is required by merely varying the mechanical arrangements under which it is used. Gun-cotton in his hands has any speed of explosion from 1 foot per second, to 1 foot in ·001 of a second, or to instantaneity. The instantaneous explosion of a large quantity of gun-cotton is made use of when it is required to produce destructive effects on the surrounding material. The slow combustion is made use of when it is required to produce manageable power, as in the case of gunnery. It is plain, therefore, that, if we can explode a large mass instantaneously, we get out of the gases so exploded the greatest possible power, because all the gas is generated before motion commences, and this is the condition of maximum effect. It is found that the condition necessary to produce instantaneous and complete explosion is the absolute perfection of closeness of the chamber containing the gun-cotton. The reason of it is, that the first ignited gases must penetrate the whole mass of the cotton, and this they do, and create complete ignition throughout, only under pressure. This pressure need not be great. For example, a barrel of gun-cotton will produce little effect and very slow combustion when out of the barrel, but an instantaneous and powerful explosion when shut up within it. On the other hand, if we desire gun-cotton to produce mechanical work, and not destruction of materials, we must provide for its slower combustion. It must be distributed and opened out mechanically, so as to occupy a larger space, and in this state it can be made to act even more slowly than gunpowder; and the exact limit for purposes of artillery General Von Lenk has found by critical experiments. In general it is found that the proportion of 11 lbs. of gun-cotton, occupying 1 cubic foot of space, produces a greater force than gunpowder, of which from 50 to 60 lbs. occupies the same space, and a force of the nature required for ordinary artillery. But each gun and each kind of projectile requires a certain density of cartridge. Practically, gun-cotton is most effective in guns when used as $\frac{1}{4}$ to $\frac{1}{3}$ weight of powder, and occupying a space of 1 1-10th of the length of the powder-cartridge. The mechanical structure of the cartridge is of importance as affecting its ignition. The cartridge is formed of a mechanical arrangement of spun cords, and the distribution of these, the place and manner of ignition, the form and proportion of the cartridge, all affect the time of complete ignition. It is by the complete mastery he has gained over all these minute points that General Von Lenk is enabled to give to the action of gun-cotton on the projectile any law of force he pleases. Its cost of production is considerably less than that of gunpowder; the price of quantities which will produce equal effects being compared. Gun-cotton is used for artillery in the form of a gun-cotton thread or spun yarn. In this simple form it will conduct combustion slowly in the open air, at a rate of not more than 1 foot per second. This thread is woven into a texture or circular web. These webs are made of various diameters, and it is out of these webs that common rifle cartridges are made, merely by cutting them into the proper lengths, and inclosing them in stiff cylinders of pasteboard, which form the cartridges. (In this shape its combustion in the open air takes place at a speed of 10 feet per second.) In these cylindrical webs it is also used to fill explosive shells, as it can be conveniently employed in this shape to pass in through the neck of the shell. Gun-cotton thread is spun into ropes in the usual way up to 2 inches diameter, hollow in the centre. This is the form used for blasting and mining purposes; it combines great density with speedy explosion. The gun-cotton yarn is used directly to form cartridges for large guns by being wound round a bobbin so as to form a spindle like that used in spinning-mills. The bobbin is a hollow tube of paper or wood, the object of the wooden rod is to secure in all cases the necessary length of chamber in the gun required for the most effective explosion. The gun-cotton circular web is inclosed in close tubes of india-rubber cloth to form a match line, in which form it is most convenient, and travels with speed and certainty. In large quantities, for the explosion of mines, it is used in the form of rope, and in this form it is conveniently coiled in casks and stowed in boxes.

The Report proceeded to give the following as the principles which govern the practical applications of gun-cotton:—

Conveyance and Storage.—One pound of gun-cotton produces the effect exceeding three pounds of gunpowder in artillery. This is a material advantage, whether it be carried by men, by horses, or in wagons. It may be placed in store and preserved with great safety. The danger from explosion does not arise until it is confined. It may become damp, and even perfectly wet, without injury.

Practical Use in Artillery.—Gun-cotton keeps the gun clean, and requires less windage, and therefore performs much better in continuous firing. In gunpowder there is 68 per cent. refuse, while in gun-cotton there is no residuum, and therefore no fouling. Experiments made by the Austrian Committee proved that 100 rounds could be fired with gun-cotton against 30 rounds of gunpowder; from the low temperature produced by gun-cotton the gun does not heat. Experiments showed that 100 rounds were fired with a six-pounder in 34 minutes, and the temperature was raised by gun-cotton to only 122 degrees Fahrenheit, whilst 100 rounds with gunpowder took 100 minutes, and raised the temperature to such a degree that water was instantly evaporated. The firing with the gunpowder was therefore discontinued; but the rapid firing with the gun-cotton was continued up to 180 rounds, without any inconvenience. The absence of fouling allows all the mechanism of a gun to have much more exactness than where allowance is made for fouling. The absence of smoke promotes rapid firing and exact aim. There are no poisonous gases, and the men suffer less inconvenience from firing. In a case-mate, where ventilation was prevented, after fifteen rounds of powder, taking aim was impossible, and in 46 rounds a gunner fell in convulsions and the rest were stupefied. At 50 rounds, in 80 minutes, firing was impossible with powder; while continuous firing with gun-cotton was sustained for 50 rounds with perfect ease, and without any inconvenience. The fact of a smaller recoil from a gun charged with gun-cotton is established by direct experiment. Its value is two-thirds of the recoil from gunpowder, the projectile effect being equal. The comparative advantages of gun-cotton and gunpowder for producing high velocities are shown in the following experiment with a Krupp's cast-steel gun, six-pounder:—Ordinary charge, 30 ounces powder, produced 1,338 feet per second; charge of $13\frac{1}{2}$ ozs. gun-cotton produced 1,563 feet. The fact of the recoil being less in the ratio of two to three enables a less weight of gun to be employed, as well as a shorter gun. Bronze and cast-iron guns have been fired 1,000 rounds without in the least affecting the endurance of the gun.

Practical Application to Destructive Purposes.—Explosion of Shells.—From a difference in the law of expansion, arising probably from the presence of water in intensely heated steam, there is an extraordinary difference of result—namely, that the same shell is exploded by the same volume of gas into more than double the number of pieces. This is to be accounted for by the greater velocity of explosion when the gun-cotton is confined very closely in very small spaces. It is also a peculiarity that the stronger and thicker the shell, the smaller and more numerous the fragments into which it is broken.

Mining Uses.—The fact that the action of gun-cotton is violent and rapid in exact proportion to the resistance it encounters, tells us the secret of the far higher efficiency of gun-cotton in mining than gunpowder. The stronger the rock the less gun-cotton comparatively with gunpowder is found necessary for the effect—so much so, that while gun-cotton is stronger than gunpowder, weight for weight, as three to one in artillery, it is stronger in the proportion of 6·274 to 1 in strong and solid rock, weight for weight. It is the hollow rope form which is used for blasting. Its power in splitting up the material is regulated exactly as you wish.

Military and Submarine Explosions.—It is a well known fact that a bag of gunpowder nailed on the gates of a city will blow them open. A bag of gun-cotton exploded in the same way produces no effect. To blow up the gates of a city with gun-cotton it must be confined before explosion. Twenty pounds of gun-cotton carried in the hand of a single man would be sufficient, only he must know its nature. In a bag it is harmless—exploded in a box it will shatter the gates to atoms. Against the palisades of a fortification a small square box containing 25lbs. simply flung down close to it, will open a passage for troops. In actual experience on palisades, a foot diameter and eight feet high, piled in the ground, backed by a second row of eight inches diameter, a box of 25lbs. cut a clean opening nine feet wide. To this, three times the weight of gunpowder produced no effect whatever, except to blacken the piles.

Explosions against Bridges.—A strong bridge of oak, 22 inches, 24 feet span, was shattered to atoms by a small box containing 25 lbs. gun-cotton laid on its center. The bridge was not broken—it was shivered.

Explosions under Water.—Two tiers of piles were placed in water, 13 feet deep, 10 inches wide, with stones between them, and a barrel of 100 lbs. of gun-cotton, placed three feet from the face and eight feet under water, made a clean sweep through a radius of 15 feet, and raised the water 200 feet. In Venice a barrel of 400 lbs. of gun-cotton, placed near a slope, in 10 feet water, at 18 feet distance, threw it in atoms, to a height of 400 feet.

IRON-CLAD SHIPS OF WAR.

Trial of the "Re d'Italia."

On Monday, the 15th instant, a trial of the first completely iron-clad sea-going frigate ever built in this country was had in the harbor of this city. We say the *first*, for, although the *New Ironsides* is a sea-going vessel, she is but partially clad, and the *Roanoke*, although cased all over, has never yet earned the distinction of being a safe and easy sea-boat.

THE SHIP.

The *Re d' Italia* was built for the Italian Government, by W. H. Webb, Esq., at a cost of $1,500,000. She is 280 feet long, 58 feet beam, and over 6,000 tuns burthen. She is iron-clad with plates whose average thickness is $4\frac{1}{2}$ inches, and is built of the best materials throughout. She is heavily sparred, three masted, and nearly full ship rigged. The model would be thought full by some; but, if the speed of the ship is any proof of its excellence, it is all that could be desired. The trial on this occasion was more for the purpose of getting the ship in perfect order for crossing the Atlantic than for any other object, so that the engines, which were comparatively untried, could be perfectly brought down to their bearings.

The Italian officers expressed to us their perfect satisfaction with all parts of the vessel and machinery; and that this conclusion was not arrived at without some consideration of the matter, will be apparent from the following incident, which occurred during a previous trip of the frigate to sea—when she ran ashore. There was a stiff gale blowing at the time alluded to, and Mr. Webb was standing under the lee of the high bulwarks, when one of the Italian officers, who understands seamanship better than he does English, approached Mr. Webb and said, "Mr. Webb, no more panic! no more panic!" The gentleman thus addressed was naturally astonished at this unconnected speech, and, on asking its meaning, received for an answer, that the English and French ships had behaved so badly at sea that they—the Italian officers—felt great apprehension about crossing the Atlantic in a similar vessel; these fears were set at rest by the admirable behavior of this vessel, whose motions, when the gale was at its hight, were so easy that an individual who stood on the extreme end of the bowsprit said that the water never even touched her hawse-holes.

HER SPEED.

The great question of the speed of the ship—

which, next to her sea-going qualities, was the most important one—was satisfactorily ascertained. *It is beyond dispute that the ship attained a speed of 12 knots an hour!* This is proved, first, by the estimation of old sailors, such as Captain Comstock, Commodore Gordon, the pilot, Mr. Collins, &c.; secondly, by actual measurement on the chart; thirdly, by the nominal distance over which the vessel sailed; and, most conclusively of all, for the ship ran in smooth water, by the revolutions of the screw. This will appear further on. The ship was not stripped for a race, but was heavily loaded, having over 100 tuns more coal aboard than her complement, all her crew and stores, spare rigging, a spare screw weighing 30,000 lbs., boats, four heavy guns, and two big dogs. With this load the ship was well down, drawing scant 24 feet aft, and a little less forward, say 23 feet on an even keel. Now, if 12 knots, with a strong ebb tide and stiff breeze dead a-head, is not a good record with a ship of the size, tunnage, and draft of water of the *Re d' Italia* (having new engines), then it is difficult to say what would be considered a fair performance.

HOW SHE STEERED.

Four men at the wheel steered this enormous iron-clad with the greatest ease. She obeyed the slightest hint of the rudder, and swung as easily when the helm was put hard over as a sail-boat rounding a buoy. She made the turn from one course to another —that is "doubling on her wake"—in three minutes; and the distance required to perform this maneuvre was, according to the pilot's statement, *less than a quarter of a mile!* The turns were all performed just below Coney Island. Those familiar with the ground, bearing in mind the ship's draft of water, can easily infer the correctness of this statement. The *Re d' Italia* can make a complete circle either to larboard or starboard in six minutes, with engines going moderately, and in a distance of half a mile. It was not the least interesting portion of the day's experiences to remark the grace with which the huge vessel swung to her helm, when it was put hard over. She went round with the utmost readiness.

OSCILLATION CAUSED BY THE SCREW.

The vibration from the motion of the screw was inappreciable. Standing directly over the stern, the fact that a tremendous force was developed a few feet below by the working of the screw, would have passed unnoticed by an unpractical person; and, by glancing down the "well-hole," where the sea could be seen in violent agitation, there was no back-water or piling-up of the water in the hole, or other defect which would have interfered with the progress of the vessel. The captain's desk stands against the after-bulkhead, next the screw, and, if much vibration were apparent, it is needless to say that this piece of furniture would occupy some other apartment. It is stated that the jar occasioned by the oscillation of the stern is so great on the English frigates, *Orlando* and *Mersey*, that it is impossible for men to go to the "main truck," the most agile seamen being unable to "stick to the stick."

THE ENGINES.

The steam machinery of the frigate is of the most powerful kind; it was built by the Novelty Iron-works, and it consists of two horizontal back-acting engines, 84-inch cylinder and 45-inch stroke. The valves are slides, worked by link motions, with an independent cut-off on the back, driven by a separate eccentric as usual. The range of the cut-off valve varies from 6 to 28 inches, and the expansion is effected wholly by it, there being no lap whatever on the main steam valve. Steam is furnished by six large boilers, of the vertical tube pattern, having double banks of furnaces, 600 square feet of grate surface, and a total heating surface of —— feet. (This latter quantity we were unable to obtain.) The screw is composition, hoisting, two-bladed, with a diameter of 19 feet, a mean pitch of 30 feet, and a width of blade (greatest) of 6 feet 3 inches. This enormous casting weighs 30,000 lbs. These engines have a nominal power of 1,425 horses each, and a much higher indicated horse-power. If it be fair to estimate the indicated at three times the nominal horse-power, the reader can make the calculation himself, and form some idea of the steam engines of this frigate. The engines labored under the disadvantage of having a troublesome crank-pin and new brasses; but, notwithstanding this, a maximum velocity of 51½ revolutions was obtained with 24 lbs. of steam, a vacuum of 24 inches, and the throttle *half open*. Under these conditions, and following 5-16ths of the stroke on the piston, the engine made the turns indicated (51½), and could have been driven faster but for the anxiety respecting the new brasses on the forward crank-pin. As the pitch of the screw is 30 feet, the reader can multiply this by the revolutions, these by 60—the minutes in an hour; and thus obtaining the actual travel of the screw, he can deduct one-fifth for slip, and find out, approximately, the rate of the ship through the water.

The engines, under low speed, at 40 turns, had all the steam they required from four boilers; the safety valves, also, leaked considerably, and, for a good portion of the trip, the furnace-doors were open. The consumption of coal was stated to be less than 12 lbs. per square foot of grate surface per hour; but, as no actual account was taken of the amount burned, we do not vouch for this. It must be born in mind that the throttle was only half-way open, and that the steam was low compared with what may be carried in the boilers—35 lbs. per square inch—if desired. There is not the slightest risk in saying that, with 30 lbs. boiler pressure, throttle wide open, and engines in good condition, they will attain 60 revolutions per minute, and a piston speed of 450 feet in the same time. Very few engines of like dimensions attain to even 375 feet per minute, as did those here described. They were put in the ship by Mr. William H. Wood, an able mechanic, at the works mentioned previously.

CONCLUSIONS.

By this trip, and the previous trials, the following points are settled:—That we possess, in the talent of our ship-building and engineering firms, the ability to construct iron-clad ships-of-war that shall be strong, safe, and swift vessels; and that, either for fighting or running, they are fully equal, if not greatly superior, to those recently constructed abroad—the *Warrior*, and other first attempts of the English, not being worth talking about in this connection. Great improvements have, however, been made recently, and our readers will find an account of the performances of some of the latest English iron-clads, on another page. Our own Government is fully alive to the importance of this question, and had a commission on board on this occasion, consisting of Commodore Gordon and Chief Engineer Kimball, to examine into and report upon the merits of the frigate. It was the unanimous verdict of all present—both engineers and commanders—that the vessel was capable of making twelve knots, and that she was the fastest war-vessel afloat.

THE WORLD'S INDEBTEDNESS TO SCIENCE.

The second lecture of the course under this head was delivered by Professor Doremus at the Cooper Institute on the 11th instant.

The subject of the discourse was "Light"; and the lecture was attended by a large and appreciative audience. Although of the most vital interest, this subject is scarcely capable of being made so interesting to a miscellaneous concourse as that of "Electricity"; this view is, in a measure, corroborated by a statement of the professor himself, which was to the effect that it would be impossible, in the brief limits allotted to him, to give any very extended account of the discoveries made concerning light and the laws governing its action. Nevertheless, Professor Doremus, in a succinct and entertaining manner, gave statistics concerning the passage of light, illustrating these statistics by facts relative to the distance of the heavenly bodies, and the speed at which light must move to reach our earth. He said that the very star-rays we gazed upon, or which reach us in a clear night, were old, having been years upon their way to this globe—a very happy illustration of the remoteness of some of the planets; for the speed of light being 200,000 miles per second, some slight impression is thus conveyed of the vast space intervening between this earth and the star-suns which twinkle so brilliantly in the heavens. Sir William Herschel estimated that some of the nebulæ, which were faintly visible by the aid of his great reflector, were so remote that the light, in coming from them to us, would be two millions of years on its way!

Allusion was also made to the chemical composition of light; to its action on certain other chemicals, as displayed in the daguerreotype; to the decomposition or analyzation of color by the electric current, as displayed in a revolving disk colored with the various tints; to the undulatory theory of light; to the generally received construction of the sun; to artificial light—especially that of petroleum; to the painting of the forest leaves in autumn, &c. With reference to the color of the leaves, the lecturer said that it was now ascertained to be due to the photographic effect of the sunlight, rather than to frost; and he accounted for this theory by saying that the sap was changed in its nature at this season, holding saline substances sensitive to light, which sap, when it reached the leaves, was acted on by the sun, and produced these beautiful colors.

All, or at least a great portion, of the statements were illustrated by actual experiments; and, of these latter, the passage of the electric light through certain chemicals in glass tubes, and also through a vacuum, were conclusive evidence of the theories previously advanced. Our space is too short to advert to all the lecturer said; but the attention of the audience, as well as the numbers composing it, was the most convincing proof of the popularity of science.

There was only one unpleasant feature connected with this lecture, and this was perhaps unavoidable. We allude to the "bore," who usually sits behind a man, and explains experiments (always incorrectly) to his neighbors, talks when he ought to keep his mouth shut, and evinces his approbation by a grunt. People ought to bear in mind that scientific lectures are for instruction and profit; and that they have no right to conduct themselves so as to deprive others of the pleasure they expect.

Professor Doremus's Third Lecture.

The third lecture of Professor Doremus's course on the "Imponderable Agencies" was delivered in the large hall of the Cooper Institute, on Monday evening, February 15th. Every seat was crowded, and many persons were standing in the aisles.

SOURCES OF HEAT.

The lecturer stated the subject of that evening to be the best understood of all the imponderable agencies—Heat. The professor said:—"Our principal source of heat is the sun. It is calculated that the amount of heat which the earth receives from the sun in a year would melt a body of ice, 100 feet thick enveloping the whole earth. But the most surprising fact is the amount of heat that we receive from the stars. While the heat from the moon can be detected only by the most delicate instruments, and while the heat from a single star is insignificant, the combined heat from all of the stars amounts to four-fifths of that which we receive from the sun—or enough to melt a mass of ice enveloping the earth to the depth of 80 feet!

"Another source of heat is the molten interior of the earth. As we penetrate earth's crust we find that the temperature increases about $1\frac{5}{10}^{\circ}$ for every 100 feet. This rate would give us, at the depth of 30 miles, a temperature which would melt most rocks. But allowing the solid crust to be 100 miles in thickness, then if I had a globe 80 inches in diameter, about the distance that I can hold my hand above the floor, the solid crust would be represented by a shell one inch in thickness.

"Still another source of heat is chemical affinity."

LATENT HEAT.

"The experiments which I shall exhibit this evening are intended to illustrate latent heat—the principle discovered by Dr. Black, of Glasgow. If a mass of ice, at the temperature of zero, Fahrenheit, is brought into a room, the temperature of which is so adjusted that it will warm the ice at the rate of one degree a minute, the ice will grow warmer at this rate for 32 minutes until it reaches the temperature of 32° above zero. The rise of the temperature will then stop, and it will remain at 32° for 142 minutes, during which time the ice will be melted. The 142° of heat which the water absorbs in changing from the liquid to the solid state is concealed—not manifesting itself to the senses or to the thermometer; it is therefore called hidden or latent heat.

"On the other hand, when water is changed from the liquid to the solid state, the 142° degrees of heat which it holds in the latent form is given out. I

have here a tight tin box, and in this pan some lumps of quick-lime. Now if I pour some water on the lime, the water will enter into chemical combination with the lime, and will be solidified—giving out its 142° of latent heat. I will put this ground coffee into this cold water, and set the dish into the box. I will also place some eggs and oysters in this pan and place the pan in the box. Now if I pour some water upon the lime and close the lid of the box, I think we shall find that the water in solidifying will give out sufficient heat to cook the eggs and oysters, and to draw the coffee. Though the lime absorbs the water it exhibits no appearance of moisture. The water becomes as solid and as dry as the lime. [A great cloud of steam arose from the box, and at the close of the lecture the food was found to be cooked.] Water in changing from the liquid form to the gaseous, absorbs and renders latent not less than 1,000° of heat. The law applies to all substances; in changing from the solid to the liquid form, or from the liquid to the gaseous, they absorb and conceal a quantity of heat; the quantities varying with the several substances."

CARBONIC ACID.

"I have in this glass-beaker some marble dust. It is the carbonate of lime—composed of lime and carbonic acid. If I pour some sulphuric acid upon it, the stronger acid will seize upon the lime and the carbonic acid will be set free in the form of an invisible gas. After the beaker is filled, as the gas continues to be generated, it will be forced over through this curved tube into this large glass vase. As the carbonic acid is as invisible as air, we will test its presence by lowering into the vase a lighted candle, which will be extinguished as soon as it enters the gas. You see the vase is about half full. As soon as the vase is filled I will demonstrate that carbonic acid gas is heavier than air by pouring it down this trough." [A light wooden trough some ten feet in length, with a hopper at the upper end, was inclined from the stage down towards the audience, and the assistants lighted a series of short candles and fixed them along the bottom of the trough. The lecturer then placed the brim of the large vase over the hopper, and inclined the vessel in a way to pour its contents into the hopper. As the invisible gas flowed downward along the trough, all of the candles were in succession extinguished. This striking experiment elicited universal applause.]

THE CONDENSATION OF CARBONIC ACID.

"At ordinary pressures carbonic acid retains the gaseous form; but under a pressure of about 900 lbs. to the square inch, it is condensed to a liquid. In this strong wrought-iron vessel, I placed a quantity of carbonate of soda, and filled a copper tube within the vessel with sulphuric acid. Then after the vessel was very securely closed, it was inclined on its trunnions, so as to pour the sulphuric acid from the tube into the carbonate of soda. The carbonic acid from the soda was set free in such quantities as to raise the pressure to the point of condensation. The liquid was then discharged into another similar vessel, which I have here surrounded with ice. By repeating the process several times, I have collected about a gallon of liquid carbonic acid. I have a little in this small strong glass tube. You see that it is as pellucid as water, and more fluid. If the tube should be cracked, or even scratched, an explosion would follow, and the liquid would suddenly expand into a gas. If we allow a portion of the liquid in this iron vessel to escape into the air, part of it will expand into gas, and in the act of expanding it will absorb so much latent heat as to freeze the rest of the liquid that escapes, and we shall have solid carbonic acid." [The assistants then opened the stop-cock a little, a sound like escaping steam was heard, and presently they brought forward a stout cotton bag which contained a pound or two of a white, snowy-looking substance which was solid carbonic acid.]

FREEZING MERCURY.

"If we place this carbonic acid on some mercury, and dissolve it with ether, as it assumes the liquid state, it will absorb so much heat from the mercury as to freeze that liquid metal. [A couple of pounds of mercury were poured into a wooden mold, and covered with the solid carbonic acid, upon which was then poured some ether from a bottle. In two or three minutes the lecturer turned the mercury from out the mold in the form of a solid bar, which he threw down upon the floor without breaking it.] This solid mercury cannot be less than 40° below zero and it is probably 60° or 70°. If touched to the wrist it will freeze the skin instantly, raising a blister as quickly as if the skin were touched with a red-hot iron. Any one who chooses may try the experiment."

FREEZING MERCURY IN A RED-HOT CUP.

"The extremes of heat and cold may be exhibited in a very striking manner, by means of solid carbonic acid. This platina cup [holding about a gill] you see is red-hot. I will fill it with some fragments of this solid carbonic acid, which I will wet with ether. If I now introduce this thimble-full of mercury into the middle of the mass, it will soon be frozen. A portion of the carbonic acid takes the spheroidal state, which prevents its contact with the heated platina, and thus the cup continues red-hot, while the mercury in its middle is freezing." [In about two minutes the thimble was withdrawn, and the solid lump of mercury was knocked out of it upon the table!]

GODWIN'S PATENT LUBRICATOR.

The object of this invention is the admission of oil or melted tallow to the cylinder and other parts of the

steam engine under steam pressure, in such a manner that it cannot escape during the admission of the lubricating substance.

The inventor says:—"It is evident that every arrangement to effect this object must consist of two chambers or reservoirs, with two valves so connected and operated that one valve shall always be closed to prevent the escape of steam while the other is open for the passage of the lubricating substance, and that these offices should be alternately performed by each valve. This lubricator will accomplish the object in a manner at once simple, convenient and effective."

In the engraving A represents a combined feeding cup and stuffing-box screwed to the top of the reservoir, B. In the lower part of the reservoir a tube, D, rises, through which a channel communicates with the machinery to be lubricated; the top of the tube forming the seat of the lower valve, C. A boss (not shown in the engraving) also projects downward from the top of the reservoir, B, and is provided internally with a screw thread, which receives the hollow vertical shaft, E. This shaft is tubular from the top to a point near its bottom. The bore within it communicate with the cavity of the reservoir, B, by the holes, *b b*, and with the open feeding cup, A, by means of the apertures, *a a*. F is a screw plug and handle moving up and down in the shaft, E, and opening or closing the apertures *a*. The threads by which this screw plug moves in the shaft, run in an opposite direction to the threads by which the shaft is moved up and down in the boss on the upper end of the reservoir. The lower end of the shaft is seated upon the upper end of the tube, D, forming a closely-fitting valve.

The operation of this lubricator is as follows:—By turning the handle, F, in one direction the screw plug attached to it descends upon its seat, inside and just below the holes, *a*, closing the apertures, *a*, the motion of this handle is thereupon communicated to the whole shaft, E, which, held by screw threads running in an opposite direction to those of the plug, begins to move upward and opens the lower valve, C. Upon reversing the motion of the handle, the shaft, E, screws back again, closing the lower valve, C. The moment this is done the motion of the shaft stops, and if the movement of the handle, F, be continued, the upper valve plug rises again, opening the apertures, *a*, as before. By grasping the milled collar, H, the lower valve may be screwed down upon its seat independent of the use of the handle for that purpose.

The object of the tube, G, is to prevent the condensed water from being fed through to the machinery; besides this, the oil rises above the condensed water and flows into the tube, F, thereby making a most complete and accurate self-feeding cup, regulated by the quantity of steam admitted into the reservoir; for as the steam condenses and the water accumulates, the oil must pass out through D. The water may be drawn off by the tube, G, or by a small cock at the bottom of the reservoir.

This lubricator is an improvement on one which was patented on Nov. 3, 1863, by T. W. Godwin, of Norfolk, Va. For further information address Hayden, Gere & Co., 84 Beekman street, New York, who have the article for sale.

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

This Association held its regular weekly meeting in its room at the Cooper Institute on Thursday evening, Feb. 11th; the President, S. D. Tillman, in the chair.

The chairman presented the following summary:—

OCCULT POISONS.

Prof. Letherby, of London, has ascertained that nitro-benzole and aniline in their free states are powerful narcotic poisons. As these substances are produced in the process of making coal-tar dyes, persons engaged in that manufacture should be on their guard. Nitro-benzole may remain a long time in the system before producing any effect, and then, after exerting its fatal power, it is so changed as to leave scarcely any traces of its presence.

THE WEATHER AND WEATHER PROPHETS.

Sir John F. W. Herschel has an interesting article under this head in *Good Words*. He says that it is ascertained that the winds in their changes have a tendency to "follow the sun," that is to so change as to turn the vane through the south, west, north and east in the northern hemisphere, and the opposite way in the southern hemisphere. Mr. Dove has connected this with that great fact which underlies so many other phenomena—the rotation of the earth upon its axis.

TYPHOID FEVER.

Prof. Sigri, in a memoir to the French Academy, states that the infusoria, *Bacteriums*, were found in the blood of a man who died of this disease at the hospital of Sienna. It has long been suspected that malaria is an animal or vegetable organism.

A PARASITIC PESTILENCE.

Van Rundoff Leuchart states that one-sixth of the annual deaths in Iceland are owing to a little parasitic animal living in the dog. The larva if kept in an undeveloped condition grows to a large size. These larvae infest both men and cattle.

TIDE WAVES AND WIND WAVES.

This being the regular subject of the evening, it was next taken up.

The Chairman:—"The self-registering tide-gauge used in the U. S. Coast Survey was invented by Joseph Saxton. One of the most interesting cases o

the use of this instrument was that of the great earthquake in Japan, on the 25th of December, 1854. The tide-gauge at San Diego, in California, registered unusual curves, and the officer at the post, Lieut. Trowbridge, expressed the opinion in his report that it was caused by a submarine earthquake. This proved to be the case, and the wave came clear across the Pacific Ocean—5,000 miles! From the curves of the tide-gauges at San Diego and San Francisco, Prof. Bache calculated that the rate of motion of the earthquake-waves was from 365 to 370 miles per hour, and that the average depth of the ocean on the San Francisco path was 2,500 fathoms, and on the San Diego path 2,100 fathoms."

Mr. Wiard:—"Speaking of the action of the tide on wheels, a singular incident happened, a short time since, on board a small steamboat that I had charge of, while anchored off the Battery. (New York.) The pumps had been in use, and during the night the tide turned the wheel, and pumped the tanks full of salt water. Had the boat been neglected, she would have pumped herself full of water and gone to the bottom."

Several other speakers made interesting remarks, but we believe not new to our readers.

Correspondence

Firing Cannon under Water.

MESSRS. EDITORS:—I beg leave to forward for insertion in your valuable journal (which I always read with much satisfaction) a short history of some experiments made in the spring of 1862, in firing shots under water, from a gun, the muzzle of which was 5 feet, more or less, under water. The recoil appeared to be entirely controllable; and in experimenting with the same gun after the tide had left it dry, it was said by Mr. Woodbury that, with the same charge, the recoil was actually greater than in the experiments where the gun was fired below the surface. As I was not present, and had no one acting for me to note the result, I cannot vouch for this; but I have no reason to doubt the fact. The only solution I can give is that a gun fired above water displaces instantly a column of air from the bore of the gun, and the atmospheric pressure added to the force of the explosion adds also to the recoil by suddenly filling the vacuum; whereas, when a gun is fired under water, the return of the water to the bore is not so sudden as that of atmospheric pressure, or air, and therefore there is less recoil. I do not make this suggestion as an expert in hydrostatics or philosophy; but if the fact *be* a fact, how can you account for less recoil? On the other hand, why should there be more recoil to a gun fired under water? R. B. FORBES.

Boston, Mass., Feb. 3, 1864.

SUBMARINE ARTILLERY.

This mode of warfare seems to be attracting much attention, at this time, both here and abroad. Many years ago the firing of guns under water was successfully tried by Robert Fulton. In the spring of 1862 I tried some experiments tending to show that guns can be fired under water, with effect, without bursting. The guns—one a brass smooth-bore weighing about 1,800 lbs, caliber 12 lbs; and the other a rifled iron gun, of about the same weight and caliber—were mounted on a cannon-truck carriage, in an ordinary box dock at East Boston; the muzzle protruding through a small hole, on the outside of which was a port, made water-tight and so arranged that it could be opened and closed at pleasure. When the gun was loaded and the muzzle for a space of two feet "woulded" with strands of rope and greased, the gun was run out through the tube; the muzzle itself being stopped with a tin cannister projecting about a foot outside the muzzle and luted with tallow, so as to effectually exclude the water. The water-line being five feet above the hole or port, it follows that some water came into the dock; but when the gun was run out quickly very little entered, the hole or port being deep enough to permit the same to be plugged by the gun simultaneously with the raising of the lid or shutter from the outside by a rude lanyard or tackle.

A target—consisting of spruce plank well trenailed together, about 8 feet square and 2 feet thick—was suspended at a distance of 11 or 12 feet from the muzzle of the gun. As many persons predicted that the gun would burst, or the dock be stove in, a wide berth was given to the vent by attaching a long string to the primer. The gun was loaded at first with 2½ lbs of powder, and an elongated "shenkle" projectile weighing about 17 lbs. The report and the recoil were very slight and the projectile striking diagonally only penetrated some 6 or 8 inches, nearly burying itself but no more.

The second fire, made under similar conditions but with increased charge, say 3 lbs—drove the projectile about twenty inches into the target; the recoil was 7 or 8 feet, and less than was expected.

The rifled iron gun was tried under similar circumstances and with similar results—it being fully demonstrated that an ordinary iron or wooden ship can be easily penetrated by a small projectile fired from an indifferent gun, 5 feet or more below the surface, at the distance of about 12 feet from the muzzle of the gun.

The experiments would have been more extended but for the fact that the old and shaky dock gates were strained and made to leak, and it was quite clear that prolonged firing would very soon entirely demolish them. The experiments were made under the immediate superintendence of Mr. J. P. Woodbury, who claims to be the inventor of this mode of warfare. Robert Fulton suspended his gun in the water and fired it by means of a tube leading to the vent. In the case above described, the dock was intended to represent the hold of a ship, and the rude and leaky port and shutter were intended to represent or take the place of fixtures which need not be fully described here, but which the exercise of ordinary ingenuity would make so mechanically perfect as to exclude from the ship the inroad of an inconvenient quantity of water. It will be enough to say that in a vessel built to fire guns under water, it would be necessary to have regular stuffing boxes, and the recoil of the gun so regulated by compressers or other usual means as to keep the muzzle end of the gun in the stuffing box, after firing, long enough to close the outer part of the hole or port, or stuffing box; then when the gun is run in still further in order to load, all the water that would enter the ship would be the capacity of the bore of the gun, and this would be of no consequence. In running the gun outward, the muzzle being stopped effectually by a cannister, the gun enters the stuffing-box and plugs it tight enough to keep out the water; then the outer port is raised and the gun run out to battery, ready for use. It is fully believed that a gun of heavy make, of 6-inch bore, throwing a well-fitting elongated projectile, would do considerable damage at a distance of 30 or 40 feet, and possible much further.

The writer of this article actually made a contract with the Navy Department for the construction of a gun-boat, partially plated, to mount a gun such as is above alluded to; and she would have been built but for the fact that a sudden rise in materials and labor rendered it inexpedient to go on.

The dock experiments were made under great disadvantages, in consequence of the weakness of the gates, the angle of which presented a much larger surface for the action of the submerged gases than the sharp bow of an iron steamer; and the target, being suspended and consequently movable, did not present so rigid a surface as the side of a ship.

About the time of Mr. Woodbury's experiments an engineer of New Bedford—Mr. Durfee—brought to the notice of the writer another mode of carrying out the same object; and he submitted to the Navy Department a very elaborate drawing of his process—indeed, several plans for submarine firing were brought out in this country, and one at least in Europe about the same time. But the Navy Department, having very small means for testing similar experiments, could do nothing in that way; and thus sub-marine firing seems to have slept until quite recently. Congress should give the Navy Department a considerable sum to test similar inventions.

R. B. F.

Strength of Steam Boilers.

MESSRS. EDITORS:—On page 71, present volume of the SCIENTIFIC AMERICAN, a tabular rule is given to find the safe pressure in cylindrical boilers, of any diameter or thickness of iron. A diameter of 1 inch, and ⅛-inch iron forms the basis of the table; a pressure of 2,500 lbs. to the inch is assigned to that diameter and thickness of iron. This view supposes a pressure of 2,500 lbs. is sustained by each ring of the cylinder of 1 inch in width. For larger cylinders, reduce the pressure by dividing the 2,500 lbs. by the diameter, and to the quotient add any increase in the thickness of the iron. Hence, with a 40-inch diameter, and a ¼-inch iron, the indicated pressure would be 125 lbs. to the inch, which, multiplied by the diameter of 40 inches, gives an expansive force of 5,000 lbs. on each ring of 1 inch width.

The error pervading the above formula consists in taking the rings of the cylinder as of sufficient strength and stiffness to retain their shape if the continuity of the circle were cut. The piston of a steam engine is unyielding in its form, and the area of its base determines the force. But the shell of a boiler is flexible in form and material; and the force to rend it asunder with steam of a given density is as the semi-circumference and not as the diameter. The "diameter theory" places and limits all the forces to part the boiler at right angles to the diameter, and ignores other effective directions of the steam pressure. Hence it follows that the boiler would be torn apart at two opposite points only; each half retaining its original shape unimpaired, and excluding all outward explosive force.

The error thus noticed is general, and has been (and may still be) the cause of numerous explosions. The true explosive force, with steam of a given density, is 52 per cent greater than has been estimated, or as the semi-circumference is to the diameter. T. W. B.

Cincinnati, Ohio, Feb. 10, 1864.

Heating Feed-water for Steam Boilers.

MESSRS. EDITORS:—As everything that assists in reducing the consumption of fuel in steam boilers is a great object at any time, but especially now that the price of coal is so high, and as it is well known that, during the injection of cold water, extra firing is required, I herewith send you a description of a method of heating the feed-water, which I adopted some years ago, with the greatest success and with a considerable saving of fuel.

Procure or construct an iron tank of sufficient size and of any convenient shape; attach at opposite sides, close to the top, the exhaust steam pipe from the cylinder. Between this tank and the cylinder—at any handy place, but the nearer the cylinder the better—insert in the top or side of the exhaust pipe another smaller pipe, through which the cold water is to pass into the exhaust steam, thereby partially condensing it, but effectively heating the water, which drops on its way into the tank, when it is ready to be pumped into the boiler. The cold-water pipe is better if made to run down inside the exhaust pipe a few inches and have a rose head on the end to spread the water amongst the steam. The following hints to those adopting this plan will not be out of place here:—Be careful that the exhaust pipe inclines downward (if only slightly) from the place where the cold water enters, to prevent any returning to the cylinder in case it is not turned off when the engine is stopped. The tank must not be below the level of the feed pump, as it will not raise water of this temperature; and an overflow cock should be fixed on the tank, on a level with the bottom of the exhaust pipe, which may be always open, and will tell when to stop the supply of cold water, as well as prevent accident. Unless the exhaust pipe is at present extra large, a length with a larger diameter should be put in where the cold-water pipe and the rose are inserted.

WM. TOSHACH.

Schenectady, N. Y., Feb. 10, 1864.

[We are obliged to our correspondent for many letters containing useful information, and we shall be pleased to hear from him again.—EDS.

THE steam boiler of R. S. Harris, illustrated on page 96, present volume of the SCIENTIFIC AMERICAN, was described as being well suited to factories and saw-mills; the proprietor thinks we should also have stated that it was adapted to steamers and locomotives as well. We add this, and also say that it is a most excellent boiler, and we have no doubt that our readers are fully aware of its good points.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week ; the claims may be found in the official list:—

Screw Tap.—The object of this invention is to provide for the tapping simultaneously of two opposite holes in the two tube sheets of a boiler, or in any other two pieces of metal or other material, at any distance apart, in such manner that the threads in the said holes shall be true to a common axis, so that a pipe or other piece may be screwed simultaneously into both; and to this end it consists in a tap with two heads, one or both of which are made adjustable lengthwise of the shaft of the tap, to bring them at the requisite distance apart; also in an arrangement of portions of the tap for the reception of two wrenches, in such a manner that in the tapping of the two holes simultaneously the shaft may not be subject to torsion. James Howell and David Birdsall of Jersey City, N. J., are the inventors of this tap.

Cable-protection for Iron-clads.—Circumstances may often arise when it is absolutely necessary for an iron-clad vessel to anchor under an enemy's fire; and in such case it is of course essential that the cable to which the anchor is attached should be protected from shot; this protection is now obtained in the iron-clads of the monitor class already built, by an anchor well, but that device is incompatible with the rate of speed now required for such vessels. This invention consists in constructing a hawse-hole in the armor shelf or through the wooden backing placed behind the iron armor, in such manner that it emerges below the water-line. It also consists in protecting the cable between the point where it comes out of the upper end of the hawse-hole behind the armor and the place where it passes below the deck to the anchor-hoisting apparatus, by means of an iron hood securely fastened to the deck. This latter protection is only required when the upper end of the hawse-hole is above the deck of the vessel. Isaac Newton, of No. 256 Canal street, New York city, is the inventor of this improvement.

Elevator for loading Locomotive Tenders.—This invention relates to a device for loading freight-conveying vehicles, whereby a great saving in labor and time is effected. The invention is more especially designed for loading locomotive tenders with wood or coal and cars with freight, but it may be advantageously used in many cases for loading other vehicles or carriages. The invention consists in the employment of a rising and falling tray, operated through the medium of pulleys and ropes, the latter being attached to a wheel provided with grooves so arranged that when the platform reaches the necessary or desired hight, it will be automatically tilted to discharge its load. The invention also consists in the use of a division board arranged with the tray in such a manner that it may be conveniently adjusted for dividing the tray, into two equal compartments when only half of a tray load is required to be dumped; and also be capable of being removed out of the way when not required for use. The invention further consists in a self-adjusting fastening to secure the swinging side of the tray in a closed state while the latter is being elevated, and admit of said side swinging open when the tray is tilted to discharge its load. R. D. Chatterton, of Bath, England, is the inventor of the above improvement His present address is Cobourg, C. W.

Buffer for Railroad Cars.—This invention consists in having a wedge or a series of wedges attached to or forming part of the coupling bar of a car, and using in connection therewith a spring or springs and one or more levers arranged in such a manner that when the coupling bar is forced in by collision or otherwise, the wedges of the coupling bar will act against the springs through the medium of the levers, the fulcra of the latter being so placed as to increase the resistance or power of the springs and render the latter very effective in resisting concussions; so much so that in case of two trains of cars coming in contact under ordinary speed, the momentum will be completely absorbed by the resistance of the springs and the cars prevented from being turned from the track either by the force of impact or by recoil. The invention further consists in using, in connection with the levers aforesaid, supplemental levers arranged with springs in such a manner as to form a draw buffer in case of recoil, and still admit of the coupling bar being readily drawn out when required to be adjusted for use. R. D. Chatterton, of Bath, England, is also the inventor of this improvement. His present address is Cobourg, C. W.

Improved Wheeled Vehicle.—This invention consists in the employment of swivel bars or stirrups to which the axles of the front wheels are rigidly attached, in combination with the ends of the front bolster and the draught-pole, in such a manner that the troublesome jerking or throwing of the pole is obviated, and the wagon, in turning, preserves its original base, like a four-legged stool, whereas the ordinary wagon, when turning, approaches to a three-legged stool, and in that position is liable to be upset; also in the use of a double-coupling pin in combination with the reach and with a cross-piece on the hind bounds in such a manner that all twisting of the reach on uneven roads is obviated, and that by putting the coupling pin next the point of the bounds the wagon couples longer than a wagon of the ordinary construction; further, in the arrangement of a spliced bolster behind, with a suitable aperture in the middle in such a manner that the reach passes through the middle of the bolster in line with the axles, and that a piece of wood is on the under side as well as on the top of each axle, rendering the same stronger, lighter and more elastic than a solid axle and bolster of the ordinary construction. Lorenzo D. Brown, of Lafayette, Ind., is the inventor of this improvement.

Spring Bed-bottom.—This invention consists in the employment of oval or egg-shaped wooden slats made of hickory or other tough and elastic wood, and provided at each end with hooks made to hook over the end rails of the bedstead, and furnished with hubs or sleeves to fit over the ends of the slats in such a manner that each slat can be readily adjusted in its place or taken out, and that by the sleeves the ends of the slats are protected from splitting. The invention consists also in the arrangement of a stop rail under the middle of the slats in such a manner that said slats are prevented from bending down beyond the limit of their elasticity, and in case they are subjected to a very heavy pressure, they are relieved from the strain by such stop rail. The inventor is A. C. Crondal, 706 Broadway, New York.

Device for cleaning Guns.—This device consists of a cylindrical plunger which has its periphery composed of india-rubber or other soft elastic material, coated with, or having incorporated into it, emery or other scouring or polishing material, and which is fitted with a screw and nut, by which it may be expanded circumferentially to make it fit as tightly as desired into the bore of the arm ; and is furnished with a screwed socket, by which it is screwed to the ramrod when the gun requires to be cleaned. P. F. Carr, Company B, 14th Regiment of Indiana Volunteers, is the inventor of this improvement.

NAVY COMMITTEE TO EXAMINE INVENTIONS.

The following gentlemen constitute a permanent committee appointed by the Navy Department to examine new inventions pertaining to naval warfare:—

C. H. Davis, Rear Admiral and Chief of Bureau of Navy.

Professor A. D. Bache, Superintendent of the U. S. Coast Survey.

Prof. Joseph Henry, Secretary of the Smithsonian Institute.

Brigadier general J. G. Barnard, Lieutenant-colonel of Engineers.

Joseph Saxton, Assistant Superintendent of Weights and Measures, U. S. Coast Survey.

The head-quarters of the committee are in Washington; and all communications should be addressed to the chairman, Admiral Davis.

THERE is no article of merchandise that has advanced more steadily since the war commenced than iron. Within a short time there has been another advance of fifty cents per keg on nails, and ten dollars per tun on iron. This makes an advance, within the past thirty days, of one dollar per keg on nails, and twenty-five dollars per tun on iron. Some statistics of the consumption of iron and steel in this country, since the war began, would afford valuable information.

MISCELLANEOUS SUMMARY.

TEN THOUSAND DOLLARS FOR A SUBSTITUTE FOR IVORY.—The well-known billiard-table makers, Messrs. Phelan & Collender, of this city, announce their willingness to give $10,000 for a suitable substitute for ivory, to be used in the manufacture of billiard-balls. This statement appears in the *Tribune* of the 11th instant, and the prize is well worth striving for; it is not often that such a liberal reward is offered for the discovery of a new and useful material. The great cost of natural ivory at the present time, owing to the high rates of exchange and its scarcity in general, is sufficient to warrant extensive experiments; for, should a substitute capable of being used for billiard-balls be found, it will not be confined to them, but will be available for a great variety of purposes. Years ago, when a substitute for leather was called for, a number of very good articles for certain purposes were brought forth, and we doubt not that, as in the case just mentioned, the artificial ivory will soon be forthcoming.

ENGLISH Toryism is up in arms at the proposition to introduce the decimal system of weights and measures into England. This proposition, which was earnestly urged upon the general consideration of Christendom at the recent National Congress, in Berlin, and on which the Hon. S. B. Ruggles, who represented the United States in that Congress, prepared a careful report, has been brought before the House of Commons by Mr. Ewart. The Tory organ in the weekly press of London, the *John Bull*, denounces it as "absurd and impudent," and as "an idea which could only enter the heads of dunces, Whigs, and revolutionary tyrants."

THE metal-tipped shoe (originally patented through the Scientific American Patent Agency) is one of those small-sized inventions that possess intrinsic merit. We have bought such shoes for our children, and we are prepared to say that one pair of metal-tipped shoes are worth three pairs of shoes without tips. We doubt not that the inventor has realized a handsome sum as the reward of his ingenuity—a remark that holds equally good in regard to thousands of meritorious inventions which, to ordinary minds, seem to possess little or no value.

INNUMERABLE letters from parties interested in mining operations have been sent to us since we published a paragraph on page 395, Vol. IX, stating that Mr. Alexander Rabe, editor of the *Hamburger Gewerbeblatt* could induce miners to come to this country, provided they were sure of employment. We have no doubt that Herr Rabe will fulfill his promise, but their better way would be to address him as above, at Hamburgh. We can do nothing ourselves.

DR. JOHN CHAPMAN, a celebrated English physician, is now engaged in making important experiments, connected with the cure of epilepsy, and other diseases of the nervous system, by the external application of ice and hot water, in rubber bags, to various parts of the spinal cord; acting thus on the sympathetic nerve, and, through it, upon the most important and vital portions of the body.

ENGLISH papers mention a case of poisoning of which a young man was the victim, he having drank cider made in a mill repaired with lead. This metal is a dangerous one to use in connection with food or drink, and repeated experience of its results should be a warning against its further employment for such purposes.

OYSTERS are among the most healthful, and nutritious of all the articles furnished for the table. When fresh, they are probably most nourishing when eaten raw; but they should not be "bolted down," as is the custom of some who love this bivalve. They should be thoroughly masticated, or, in other words, made to feel the teeth.

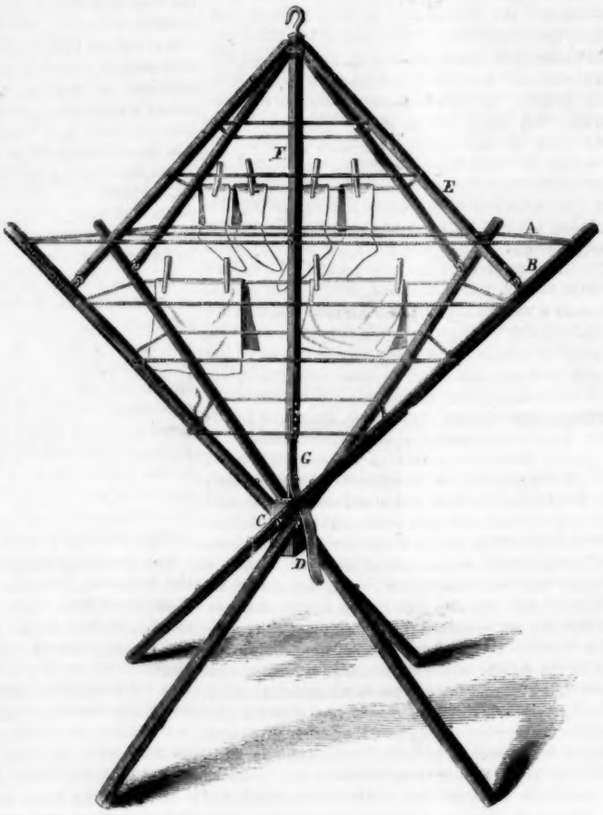
A GERMAN statistical writer remarks that the invention of the sewing machine has enabled one woman to sew as much as a hundred could sew by hand a century ago; but, he continues, one woman now demands as much clothing as a hundred did a century ago—so that the situation is not so much changed after all.

HOW FAR CAN A GONG BE HEARD?—The great gong upon Colt's factory, which sounded continually till the building was burnt down, was heard distinctly at Willimantic, a distance of 27 miles.

Improved Portable Clothes-dryer.

There can be little question that the efforts of inventors have been the means of very much lessening the labor of housekeeping; and this remark is particularly applicable to the class of domestic utensils which is herewith illustrated—the clothes-dryer. Portability, great extent of drying surface, lightness, strength and stability are all required in this article, and it will be seen from an inspection that the ends are fulfilled in the one illustrated.

The construction is quite simple, the whole affair consisting of the cords, A, interlaced through holes in the arms, B. These arms are straight sticks of handsomely-finished hardwood and are pivoted at C to an independent block, D. All this is shown in the extended figure of the dryer. To these arms beforementioned are attached braces, E, which also connect to a vertical staff, F; this latter has a strap, G, at the bottom, which is hooked over a pin, thus securing the whole structure so that it cannot be closed up accidentally, and also bracing it firmly together. There is a hook at the top, by which the dryer may be suspended when not in use. The rest of the apparatus explains itself. The extent of drying surface afforded on a small apparatus of this kind in our office—said apparatus being only about breast-high over all to an ordinary man—is 55 feet; and a great many garments can be hung on its lines and have the full benefit of a circulation of air all around. The finished apparatus weighs only four pounds. No one of the garments hangs over the other, and all have the best situation to give off moisture. This dryer can be placed near the stove or in the sun, and when not in use may be folded up and carried under the arm if needful. Large quantities of them are now being made. For further information address J. K. Davis, of Bradford, Vt. The apparatus was patented by G. W. Newell, through the Scientific American Patent Agency on Feb. 17, 1863, and assigned to J. K. Davis aforesaid.



NEWELL'S PORTABLE CLOTHES-DRYER.

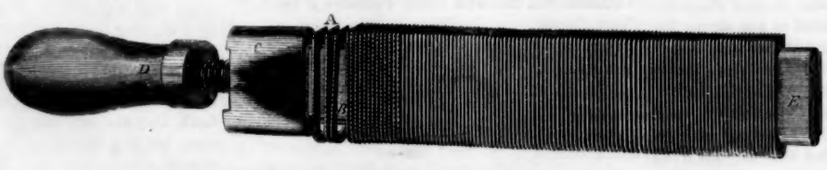
Improved File.

The tool herewith illustrated certainly possesses the merit of novelty, and if it proves to be in practice what is claimed for it by the inventor, it will be a valuable addition to the kit of the mechanic. Mischievous workmen sometimes practice on the credulity of apprentices by telling them to "go and grind their files and afterward sand-paper the grindstone." In the case of the first injunction this file could be so treated, as it is made up of a number of small steel cutters—in shape parallelograms—as shown at A, which are all slipped over a central bar, B, and there confined by a sliding shank, C, and a screw-handle, D. The construction of these steel cutters may be seen by glancing at those nearest the handle, where a number of them are shown separated from their companions. They are simply flat pieces of steel with oblong holes in them, the edges being beveled off so as to form a cutting edge. The object is to produce a file that can be easily sharpened when dull, that will be more durable than an ordinary file, and one that will work more efficiently for special purposes than files of the usual construction.

When the handle is unscrewed, the shank can be slipped off, and the cutters removed and sharpened on an emery wheel or grindstone, thus obviating the necessity of re-cutting, as is done with other files. By the aid of machinery these cutters can be punched out or rapidly made in other ways as may seem best. When the cutters are all slipped over the central bar, B, they bear against the shoulder, E, and are securely held by the handle. Files of any shape, either round, square, flat or oval, can be thus made, and for certain very large sizes we think they would be both useful and economical. A portion of the cutters are shown serrated in the engraving, while the rest of them are plain. Any desired pattern for the teeth can be furnished.

By far too many files are broken or kicked around under-foot as worthless when only half used up. It would be a source of great economy to machinists if this new file tended to prevent this abuse.

This file is the invention of R. D. Dodge, of Adel, Iowa; for further information address the inventor at that place.



DODGE'S IMPROVED FILE.

Iron Masts.

The London *Artizan* says the iron masts of the *Achilles* were successfully fitted on the 6th January last by means of the massive floating sheers, which were towed down from the dockyard to Gillingham Reach for that purpose. The iron masts are the largest ever constructed for a vessel-of-war, and were manufactured at the Bridge Works, Chepstow, by Messrs. Finch & Heath. The *Achilles* will be the first vessel in the British Navy to carry four masts; but even with this advantage her masts will be 100 feet apart. Experience has shown that iron masts last much longer than wooden, that they are lighter and stronger, serve as valuable ventilators, and are also better conductors of electricity. If they are shot away and fall overboard they will immediately sink, instead of floating alongside and fouling the screw, as is the case with wooden masts. The mainmast of the *Achilles* weighs no less than 21 tuns 12 cwt.; its length being 121 feet 9 inches, diameter 3 feet 4 inches, and length of head from hounds 20 feet. Each mast is formed of three curved plates half an inch in thickness, which form the skin or outside shell of each, the joint where the vertical edges of the plates meet being so formed that the outsides of the masts show no ridges. Under each of the vertical joints three strong tie-irons are placed to which are riveted the plates forming the mast; the rivets on the outside being countersunk or let in flush, the exterior of the mast consequently presenting a round and perfectly smooth surface. The masts are parallel from the heel to the hounds, where a horizontal plate is introduced, which is made to carry the top, and this plate facilitates the reduction of the size of the mast from the hounds to the cap. Where the shrouds pass over the masts the plates are double, to resist the extra strain and wear.

To Stop the Draft.

Mr. J. W. Browne, inventor of Browne's metallic strips and window bands, has gone to Washington with a view to introduce his invention to general use in that city. Since its introduction here it has been applied to many of the largest public and private buildings in the city.—*New York Evening Post.*

[Browne's weather-strip, referred to above, we have had in use upon the outer doors and windows of our dwelling, the past winter, and we consider that they very greatly promote, if they are not quite indispensable to, domestic enjoyment.—EDS.

The Concentration of Mineral Waters by Means of Congelation.

It is well known that the freezing of water is a crystallization; and that crystallization is one of the most effectual methods of purification. M. Moline communicates to *L'Invention* a plan for employing this property to concentrate mineral waters. He proposes to freeze a portion of the water, and then to bottle the remainder, which will contain all of the mineral substances. He suggests that the water should be gently agitated during the freezing, when the frozen portion will collect in the form of a milky snow. A cheap method of freezing would be, by mixing snow or pounded ice with salt.

Very large sums are paid in this country every year for transporting Saratoga and other waters. Could not a considerable portion of this expense be saved by concentrating the water in accordance with M. Moline's plan?

THE
Scientific American.
MUNN & COMPANY, Editors & Proprietors.
PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.
O. D. MUNN, S. H. WALES, A. E. BEACH.
VOL. X. NO. 9...[NEW SERIES.].....Twentieth Year.
NEW YORK, SATURDAY, FEBRUARY 27, 1864.

Contents:

(Illustrations are indicated by an Asterisk.)

THE LAWS OF EXPANSION.

The constituents of heat have long remained a problem for scientific men; but up to the present time no satisfactory solution of its peculiar nature has been accepted by the world at large, although very many ingenious theories have been promulgated respecting it. While this is true of heat itself, its action upon matter—solid and liquid—is, in some cases, well understood, and the laws relating to expansion are clearly defined.

The general fact that most bodies expand under heat is well known; the proportion and nature of the change however, which takes place in the object heated, is not alike in every case. Different solids or substances of dissimilar nature expand unequally, but as a rule, uniformly, and resume their former shapes and dimensions when cooled. This statement, however, must be qualified by the remark that there are exceptions in the case of certain metals, as iron, steel, and brass. While the assertion made above is theoretically correct, the fact is unimpeachable that the metals specified do enlarge permanently in bulk with successive heatings, so that it is perfectly possible to remedy spoiled, or damaged work in the machine-shop by this method—that is reheating. To illustrate this in a practical manner, take a crank pin for instance, that has been turned too small in the conical end, so that while it fills the hole in the crank it does not fit it; let this pin be heated and cooled in water three times (not so that scale will form), and it will be found that the metal has gained in size, having absorbed some element that caused its fibers to swell and so enlarge the diameter. Ligneous or woody substances also expand more sideways than lengthwise, and, when greatly heated, *contract* permanently and remain fixed. Argillaceous or clayey substances, such as pottery, contract by heat; in this case chemical changes take place, which alter the nature of the material. Lead is an utter exception to the general law of expansion, as, when under the influence of heat, the particles of metal slide over each other, and do not return to their former shape when cooled. Lead pipes when used to convey hot water, become permanently elongated, as may be seen by examining those that have been in use for years, in most cases the fastenings will be found loosened and the pipes distorted. Bath-tubs and other vessels lined with lead have the same shriveled or wrinkled-up appearance, showing that the metal has undergone alteration in form since it was first applied.

The amount of expansion in solids between the extremes of zero and the boiling point of water (212°), is comparatively little; zinc, one of the most easily affected by heat, elongating but 1-340th of its length, glass expands only about one-third of this quantity during a similar heat. The following list exhibits the ratio of expansion between different metals in the order in which they are named:—zinc, lead, tin, silver, brass, gold, copper, bismuth, iron, steel, antimony platinum and glass. This is also very nearly the order of the compressibility of metals.

When expansion is uncompensated for in machinery, a tremendous disturbance takes place, often causing it to cease its functions entirely; steam pipes are torn and twisted from their fastenings; bed-plates broken and shafts bent by this uncontrollable force. An iron rod, one square inch in section, when raised from 32° to 212° expands with a force of 35,847 pounds, or it exerts a force of 199·15 pounds for every degree (Fahrenheit) that the temperature is increased. Some phenomena observed in daily life may be traced to the laws of expansion, as, for instance, spikes driven into wood gradually enlarge the holes and loosen themselves by the changes in temperature they undergo. Iron and platinum wires may be cemented firmly to glass without danger of breaking, because they expand in nearly the same ratio; but gold, silver, or copper cannot, because their degree of expansion varies from that of glass. So also railroad tracks must be laid with a space between the rail ends, otherwise the whole line would be disturbed; accidents have frequently occurred from this cause. The same features are also observed in iron bridges. Time-measurers suffer much from unequal expansion, as where it is uncompensated for, a great change is observed in the record. Almost every material thing on the globe is affected by expansion, or the influence of heat, at some period or another; and yet the physics of this mighty agent are still undiscovered.

SUBMARINE FIRING.—ARE ARMOR-PLATES WORTHLESS?

On another page will be found a communication from Mr. R. B. Forbes, giving a very interesting account of some experiments made by him in firing cannon under water, the results according with those of the experiments in England on the hulk *Griper*, already related in the SCIENTIFIC AMERICAN, and with those made still earlier in Jersey City, a full account of which we published at the time. These experiments demonstrate conclusively that cannon may be fired under water; and that the shot, after passing through at least 20 feet of water, will penetrate the side of an ordinary ship. The *Griper* experiment showed that a loaded shell may, by submarine firing, be driven through 20 feet of water and then through six half-inch plates of iron—a resistance far greater than is offered by the bottoms of any of our ships of war.

These facts established, it necessarily follows that if any vessel provided with even a single shell-gun arranged for firing under the surface, can approach within 20 feet of the most powerful iron-clad in the world, she can sink the mailed monster. Here then is the question of the attack and defense of ships disturbed by a new element which revolutionizes the problem. We shall doubtless have a series of inventions for placing, loading, and discharging the submarine guns, with new forms of projectiles for passing through the water, and swift ships for bringing the new artillery alongside of the enemy. The maritime Powers will have, too, an opportunity of commencing again the laborious and costly task of rebuilding their navies. We would suggest the wisdom of expending little on the new styles of vessels for the sake of durability, as no one can tell how soon some other discovery may work another revolution in naval warfare.

DISTILLED WATER FOR HIGH PRESSURE ENGINES.

Mr. Norman Wiard, of this city, is just finishing four very light-draft steamboats for the Government; and, though the engines are high-pressure, the steam is condensed and used over, in order to avoid the deposit of scale or the necessity of frequent "blowing out." The condensers consist of a series of small copper tubes placed in the water outside of the boat, so disposed as to injure as little as possible the model of the vessel, and protected by wooden slats. The exhaust pipe terminates in these tubes, and the water of condensation is pumped back into the boiler.

To supply the unavoidable waste, the steam, before it is condensed, is made to evaporate a fresh supply of water. The evaporator is formed by cutting a rectangular opening through the bottom of the boat, 4 feet long and a foot wide, and covering this opening with a steam-tight copper box, 3 feet high, the box having no bottom so that the water rises to the same height in this that it does outside of the vessel. This box is filled with a number of small copper tubes, and through these the steam is led on its way to the condenser. As the water in the box is boiled and evaporated, the steam resulting from the evaporation is carried by a pipe into the condenser, while a fresh supply of water rises upward through the opening in the bottom of the boat. Thus a portion of the river is boiled as the boat runs along. It is found that the evaporator not only supplies the steam lost by leakage, but also furnishes distilled water for drinking and cooking by the crew.

There is no doubt that this is a most effectual plan for preventing the deposit of scale and sediment in the boiler, and the question is whether this advantage will be counterbalanced by an increase of back pressure in the exhaust. It would be interesting to compare some indicator cards from Mr. Wiard's engines with cards from similar engines exhausting into the open air.

WINES, ALMONDS, AND OLIVES IN CALIFORNIA.

At the meeting of the Farmers' Club of the American Institute, on Tuesday, Feb. 17th, Mr. Robinson informed the Club that Col. Haraszthy was present—one of the most extensive grape growers in the country, a man who was extending his vineyards at the rate of 500 acres per year.

Col. Haraszthy, on being invited by the Chair, gave the following account of his operations:—"When I went to California, it was supposed that the vine could be grown only on land that could be irrigated; but I determined to try it on the dry land, and I planted 40 acres. I told them that I would irrigate with the plow. My vines grew very well, and at the end of three years I had a very fine crop of grapes. The practicability of growing vines on the worthless uplands being thus demonstrated, my example was widely followed, and now there are 14,000 acres in California planted in vine yards. This year the State will turn out from 12 to 20 millions of gallons of wine."

Mr. Carpenter:—"Will Col. Haraszthy tell us what variety of grapes he prefers?"

Col. Haraszthy:—"I have imported about 1,400 varieties from Europe and Asia, but many of these are synonyms, and there are in fact but 350 distinct varieties. About 70 of these have fruited, and they are all perfectly successful."

Mr. Carpenter:—"Have you tried the Catawba and Delaware?"

Col. Haraszthy:—"Yes, and the Isabella and Scuppernong. They do very well, but the fruit is not to be compared to the fine imported varieties."

Mr. Carpenter:—"On this side of the continent we are unable to raise the European grapes, except under glass, in consequence of the mildew. Have you ever been troubled with mildew?"

Col. Haraszthy:—"In some very damp places on the edge of swamps the mildew has been observed, but not to do any harm. Our climate is too dry for the mildew."

Dr. Trimble:—"Will the Colonel please to give us a description of his mode of culture?"

Col. Haraszthy:—"I plant the vines 8 feet apart, both ways; and they are plowed between eight times—four each way. I commence plowing in January, and finish in June. The vines are then allowed to ramble all over the ground like squash vines. After the grapes are gathered, the vines are pruned; and the limbs cut off are gathered and burned. The yield is from 500 to 2,000 gallons of wine to the acre."

Mr. Williams:—"How do you make the wine?"

Col. Haraszthy:—"I have a 12-horse-power steam engine for crushing the grapes. The juice that first runs out without any pressing, is first gathered in small vats, holding 500 gallons each, where the sand, &c. is allowed to settle, to prevent any earthy taste. It is then pumped into vats holding 4,000 gallons each, where it ferments. My cellars for the fermenting vats are dug on the side hill, into the solid rock."

Dr. Trimble:—"What is the best grape for wine?"

Col. Haraszthy:—"It depends upon the kind of wine that you want to make. The Epergne makes champagne, the Johannisberg wine is made from the Risling grape, and the Noiree and Pignon make the Burgundy wine. I will defy anybody to tell my champagne from the Cliquot."

Mr. Carpenter:—"Do you raise the Black Hamburgh?"

Col. Haraszthy:—"Yes; we sell these in the San Francisco market at 25 cts. per lb; but these fine table grapes do not make good wine. I will remark that my land which is not suitable for vines I plant in almonds and olives. I have several thousand of these trees and they do very well. I have sent some almonds to the New York market. Almonds will grow wherever peaches will; you might raise them here."

THE WHISKEY CONTROVERSY.

This potent article is exciting an unusual degree of attention just now. The subject of increasing the tax on the article is now before Congress. It is proposed to tax the stock on hand; and this has, of course, brought out all the strength of the "holders." It is reported that $5,000,000 worth of the "sweet creature" will be affected by the tax; hence the strong opposition to the measure. It costs to make whiskey, about 25 cents a gallon; the present tax of 20 cents made it sell, tax paid, at 45 to 50 cents a gallon. Last fall, shrewd operators, knowing that the tax would have to be increased, commenced to buy up all the whiskey in store and pay the tax where it had not been already paid. The next move was to have the Commissioner of Internal Revenue recommend a large tax. This was done, and the official announcement was made after the stock had gone into the hands of speculators. Whiskey went up to 75 and 80 cents. When the report came into Congress, and others found it out, it advanced to one dollar a gallon. The Ways and Means Committee recommended a tax of 60 cents a gallon. This, added to the first cost, would make about 90 cents, but the house voted, by nearly a two-thirds vote, that all whiskey would be taxed, whether in store or in the hands of distillers. This has thrown the operators into tribulation. If whiskey in store must pay revenue to the Government, then their stock is only worth about 45 or 50 cents a gallon, for the additional 40 cents goes either to speculators or to the United States Treasury. It will make a difference of from $2,000,000 to $3,000,000 on the stock on hand. The latest phase of the question looks very much in favor of the speculators. Some members of Congress don't appear able to stand the "whiskey strain." It overpowers them.

ISSUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING FEBRUARY 9, 1864.

Reported Officially for the Scientific American.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

41,467.—Heater.—Orrin Abbott, New York City:

I claim, first, The combination of the water drip compartment, J, hot-air conducting pipe, O, and foul-air pipe, E, with one or more stoves or heaters arranged substantially as shown, in connection with the apartment to be heated, so that the foul air will be drawn from the compartment by the rarifying of the air in E, or the chamber with which it communicates, and a circulation of pure warm air be kept up in the compartments.

Third, Regulating the supply of water to the compartment, J, by means of the hinged disk or reservoir, n, arranged substantially as described.

Fourth, The indicator formed of the cloth, p, attached to a frame, L, inclosed within a box, K, and suspended from a scale beam, M, in connection with the water supply apparatus composed of the rotatory buckets, s, working within the reservoir, P, substantially as set forth.

Fifth, The box, G, provided with the damper, H, and communicating with the foul-air pipe, E, and arranged relatively with the feed opening, f, in the stove or heater, for the purpose specified.

41,468.—Track-clearer for Railroads.—M. J. Adams, Bedford, Pa.:

I claim the application of this combined snow plow and excavator to snow obstructions on railroads for their removal, using for that purpose the aforesaid combined snow plow and excavator, or any other substantially the same, and which will produce the same effect.

41,469.—Revolving Rake.—S. E. Ament, Oswego, Ill.:

I claim, first, The cast bearing-box, D, with stops thereon and arranged relatively to one or more stops, I J, and to the operative parts of a revolving rake, substantially in the manner and for the purpose herein set forth.

Second, I claim, in revolving rakes, the duplicate sliding bolts, I and J, arranged relatively to one or more pairs of reversed stops, W Y, and to the eccentric-sectional flanges, 1 and 2, substantially in the manner and for the purpose herein set forth.

Third, I claim the cast bush, F, formed with side cheeks, F' F'', and with notches or holes, f' f'', arranged to serve in connection with the handle, E, and with sliding stops, I J, substantially in the manner and the purpose herein set forth.

Fourth, I claim raising the entire series of teeth by the employment of the series of braces, P P, arranged to form an additional direct connection from the rigid shaft, A, to the teeth, a, substantially in the manner and for the purpose herein set forth.

41,470.—Machine for making Soap.—Avery Babbett, Auburn, N. Y.:

I claim the dies, F' and G', and the punches, I' and J', in combination with the slides, E' and A', levers, Y' and D', and cams, W' and B', or their equivalents, when used in the manner and for the purpose above specified.

41,471.—Relief Valve for Water Cylinders.—T. H. Balley, Troy, N. Y.:

I claim the combination of the valve, C, stem, d, spring, E, adjustable cap, D, and pin-hole, d', whereby the valve may be either held upon its seat with a variable yielding pressure, or may be elevated therefrom or held immovably thereon as an ordinary screw plug.

[This invention is more especially intended for application to steam fire-engines. The cylinders of these machines are generally fitted with connections for throwing two or more streams, and it is often necessary or desirable to shut off one or more of the streams, and this throws an extra pressure upon the pump and hose which is liable to cause the bursting of the hose. The only means heretofore adopted to prevent this has been to apply an escape valve which has been opened when necessary by the hand of the engineer in charge. This invention consists in a valve of novel construction, controlled by a spring in such a manner that it shall open automatically to relieve the cylinder and hose, or other pipes, of extra pressure whenever necessary.]

41,472.—Trigger Cover for Firearms.—John Birkenhead, Ilion, N. Y.:

I claim a trigger cover guard, applied substantially as shown and described.

41,473.—Lamp Chimney.—E. S. Blake, Pittsburgh, Pa.:

I claim, in a lamp chimney composed in part of plates of flat glass, the erection of any two or more of said plates in the same plane, to form a part of the shaft of the chimney, as and for the purpose set forth.

41,474.—Grain Drill.—James Bucknell, Decorah, Iowa:

I claim the particular construction of conducting tubes, H, adapted to replace the scatterers, G, covering the apertures, d, and employed in combination with the seed-box, D, slide, J, shaft, E, and scoop disks, F, to convert the machine from a broad-cast sower to a drill.

41,475.—Gridiron.—E. C. Brewster, Bristol, Conn.:

I claim as an improved article of manufacture the gridiron constructed substantially as described.

41,476.—Wheel Vehicle.—Lorenzo D. Brown, Lafayette, Ind.:

I claim, first, The stirrups, D, hinged to the bolster, E, in combination with the axles, C', of the front wheels, B', and with the draught pole, F, all constructed and operating in the manner and for the purpose substantially as shown and described.

Second, The spliced bolster, K, to operate in combination with the axles, C, and with the reach, G, substantially in the manner and for the purpose set forth.

41,477.—Harvester.—R. D. Brown, Covington, Ind.:

I claim, first, The mode substantially as described, of connecting the platform to the main frame by the swiveled coupling-rod, E, sleeves, e e', and shafts, J and J', whereby motion can be communicated to the rake on a perfectly floating platform without affecting the continuity of the rocking motion or straining the parts.

Second, In the described combination with a floating platform, end-rake and swiveled coupling, I claim the chain, R, and pulleys, O and S, or equivalent flexible device for transmitting motion to the raking mechanism, as set forth.

Third, In the described combination with a swiveled coupling, E e e' J J', I claim the device for varying the pitch of the cutting apparatus, consisting of the drag bar, F f, bracket, H, arm, G, and pin, I, or their equivalents.

Fourth, I claim the arrangement of the outer and forward endless rake-pulley, u, within a lever, d, in the rear edge of the finger bar so as to bring the front edge of the endless rake within working distance of the sickle.

Fifth, The arrangement of shafts, K and J, gear wheels, M and N, sliding pulley, O, clutch, P, and treadles, Q Q', as and for the purpose specified.

41,478.—Tool for Turning Lathes.—Amos A. Burr, Rockdale, N. Y.:

I claim the two yielding jaws, A A, provided with recesses, a a, having screw threads, b, formed or cut on them, one of said jaws being provided with a cutter, D, and used either with or without the segment rod, C, and guard or gage, E, to form a new and useful tool for the purpose specified.

[This invention relates to a new and useful tool for cutting spiral beads, on wooden articles, such as furniture, cogs, &c., turned in a lathe, and while being centered and rotated in the same.]

41,479.—Harrow.—S. P. Campbell, Rochester, Minn.:

I claim, first, A sectional harrow provided with a universal-joint coupling composed of a hook, B, on one side, and a swivel, B', on the other, or their equivalents, substantially as described.

Second, In combination with a harrow, constructed and united as described, I claim the tongue, D, when the whole is arranged in the manner and for the purpose set forth.

Third, I claim a sectional harrow, the sections of which are united by means of a universal joint, and each section being drawn from its own center, substantially as and for the purpose set forth.

41,480.—Water Indicator for Steam Boilers.—Charles H. Carey, Detroit, Mich.:

I claim the combination of the double lever, J I M, float, A, rack, B, pinion, D, index, C, and whistle, K L, constructed arranged and operating substantially in the manner and for the purposes set forth.

41,481.—Implement for cleaning the Bores of Gun-barrels.—P. F. Carr, Wyalusing, Pa.:

I claim a device for cleaning and polishing the bores of fire-arms, composed of a plunger-like body, A, of india-rubber or other elastic material, coated with or having incorporated into it emery or other scouring or polishing material, a screw, B, nut, C, and socket, D, the whole combined substantially as herein specified.

41,482.—Elevator for loading Cars.—R. D. Chatterton, Bath, England:

I claim, first, The rising and falling platform, B, formed of two separate parts, 1 and 2, in connection with the pulley, D, provided with a groove, 1'', having cuts or recesses, j j, made in it, the platform being connected to the pulley, D, by ropes, C C C' C', and all arranged to operate either with or without the tray, F, in the manner substantially as and for the purpose herein set forth.

Second, The division or partition board, H, suspended and counterpoised, substantially as shown, when used in connection with the tray, F, for the purpose specified.

Third, The swinging door or side, G, in combination with the catch, H', arranged to operate in connection with the platform, B, substantially as and for the purpose set forth.

41,483.—Buffer for Railroad Cars.—R. D. Chatterton, Bath, England:

I claim the employment or use, in a buffer for railroad cars, of springs, G, levers, F, and wedge-shaped projections, E, on a sliding coupling bar, D, arranged to operate in the manner substantially as and for the purpose herein set forth.

I further claim, in combination with the levers, F, the supplemental levers, H, and springs, I, arranged to operate in connection with the coupling bar, D, substantially as and for the purpose specified.

41,484.—Horse Hay-fork.—D. B. Clement, Brooklyn, N. Y.:

I claim the bent rod or bar, D, provided with an elastic part, e, and attached to the head, A, of the fork, in combination with the ball, C, and rod, E, all arranged to operate substantially as and for the purpose set forth.

[This invention relates to an improved means employed for discharging the load from the fork and in an improved manner of attaching the tines to the fork head and also in an improved way of suspending the fork in its ball, whereby it is believed that several advantages are obtained over the forks hitherto used.]

41,485.—Revolving Vegetable-steamer.—Selah B. Collins, Lyndon, Mich. Ante-dated, Jan. 27, 1864:

I claim the wings or elevating bars, W, which are made adjustable and detachable, substantially in the manner and for the purposes specified, in combination with the rotary steaming box, C, as set forth.

41,486.—Bath-tub.—E. F. Cook, Omaha, Nebraska Territory:

I claim a bath-tub having its back constructed with double walls to form a hot-water chamber, substantially as and for the purpose set forth.

41,487.—Cotton Gin.—T. C. Craven, Greenbush, N. Y. Ante-dated Jan. 27, 1864:

I claim, first, a series of teeth connected at one end to a cylinder, within and eccentric to an outer cylinder, so that said teeth will be alternately projected and retracted in the revolution of such cylinder, when said cylinders are connected together, substantially as described, so that they revolve in unison upon a non-revolving shaft, without strain or friction on the teeth, as and for the purpose set forth.

Second, I claim the plates, 12, constructed and adjusted as specified in combination with the cylinders, e and f, and teeth, 8, whereby the teeth can be adjusted and projected more or less, as specified.

Third, I claim constructing the teeth of the cotton-ginning cylinder of pointed wires having L-shaped bends, by means of which they are secured to the cylinder, e, by bands, 9, as set forth.

Fourth, I claim rotating the cylinder, f, in unison with the cylinder, e, by means of the pins, 11, entering into the openings in the plates, 12, at the end of the cylinder, f, as specified.

Fifth, I claim the sheet-metal guards, g, and brushes, 14, in combination with the cylinder f, and teeth, 8, as specified, whereby the said teeth, 8, do not require to be as long as heretofore, for reaching the cotton, as set forth.

Sixth, I claim conveying the cotton from the ginning cylinder up the incline, l, to the condensing cylinder by a current of air, induced by the suction blower, o, entering the opening, 19, as specified.

Seventh, I claim the arrangement of the roller, t, brush, v, and adjustable guard, w, whereby the action of said brush in separating the motes can be regulated, as specified.

Eighth, I claim the condensing cylinder, m, supported and driven by the rollers, t and y, as specified, whereby the said condensing cylinder can be formed without any central axis and with its ends open for the air to be exhausted, as specified.

Ninth, I claim the exhausted condensing cylinder, o, fitted and acting as specified, in combination with the rollers, y and z, for removing the cotton from such cylinder, as specified.

41,488.—Spring Bed-bottom.—A. C. Crondal, New York City:

I claim the sleeves, c, and hooks, d, applied to the ends of the egg-shaped slats, C, and operating in combination with the end rails, a, and stop rail, f, of the bedstead, in the manner substantially as herein shown and described.

41,489.—Gas-check for Breech-loading Fire-arms.—Frederick Curtis, Newtown Lower Falls, Mass. Ante-dated January 29, 1864:

I claim the combination or arrangement of the gas check with the barrel, as above described, with said gas check bearing within the chamber of the barrel on its outer periphery only at its front end, and with the chamber of the barrel made of the form and extending beyond the gas check, essentially in the manner and for the purposes as above described.

41,490.—Stump-extractor.—D. A. Danforth, of Elkhart, Ind.:

First, I claim the combination of the lever, A and F, hook, c, pulley block, U, and stirrup, B, for the purpose and in the manner described.

Second, The combination of the saddle, J, chain, W, and lever, F, in the manner and for the purpose herein described.

Third, The combination of the hook or guide, O, and brace, N, with a flange on the inner side of ratchet, K, and lever, F, for the purpose herein described.

Fourth, The combination of the flange, Q Q, and ribs, R S, in combination with the axle, M, and lever, F, for the purpose herein described.

41,491.—Gang Plow.—F. S. Davenport, Jerseyville, Ill.:

I claim, first, The hinged or swinging axletree, D, attached to the frame, A, as shown, in connection with the adjustable stops, e e, as and for the purpose herein set forth.

Second, The caster wheel, H, attached to the shaft, G, which is connected to the sliding bar, F, having a lever, J, attached, when said parts are used in combination with the swinging axletree, D, as and for the purpose specified.

[This invention consists in a novel and improved means for gaging the depth of the penetration of the plows into the earth and for raising them out of the earth when designed to be inoperative. The invention also consists in a novel and improved means for guiding the machine and turning it at the ends of the furrows.]

41,492.—Tea-kettle.—William C. Davis, Cincinnati, Ohio:

First, I claim the provision of a straight edge or bearing, A', at the bottom of the breast, as and for the purposes explained.

Second, The combination of the straight edge or bearing, A', with a body, A, of elliptical form, substantially as described.

Third, The combination of the elliptical body, A, longitudinal ball, C, and side-hinged cover, D, all as herein shown and described.

41,493.—Horse-power.—A. J. Detrick, Dryden, N. Y.:

I claim, in constructing a horse-power equalizer, the chain, c, and pulley, e, when placed directly upon the equalizing circuit, i, and combined with the rings, l and f, and stoppers, d and f, as described and arranged for the purposes specified.

41,494.—Fishing-line Reel.—Andrew Dougherty, Brooklyn, N. Y.:

I claim the combination and arrangement of the spool for the fishing line with a winding mechanism at one end of it, and with a friction brake at the other end of it, and opposite the winding mechanism, the whole operating substantially as set forth.

I also claim the combination of the friction brake that controls the unwinding of the line with a thumb-plate or lever handle placed between the heads of the reel frame, substantially as set forth.

I also claim the combination of the lever handle that operates the controlling mechanism of the spool, with one of the cross-bars of the frame, substantially as set forth.

I also claim a double-headed frame for an angler's reel, constructed substantially as set forth.

41,495.—Penman's Assistant.—H. G. Eastman, Poughkeepsie, N. Y.:

I claim the combination of the fountain pen or pen-holder case, B, with the palm or hand support, A, whether made of metal, hard rubber, or other substance, for the purposes hereinbefore set forth.

41,496.—Petroleum Stove.—W. T. Eddy, West Hoboken, N. J.:

I claim, as a new article of manufacture, the petroleum stove constructed as above described, with a bottom plate, B (adapted to receive one or more lamp burners), a top plate, C, window, c, chimney, D, and deflector, G.

[An engraving and full description of this invention was published on page 233, Vol. IX., SCIENTIFIC AMERICAN.]

41,497.—Horse Collar.—Chas. J. Fisher, Waukon, Iowa:

First, I claim dividing the side pieces, A A, of the collar transversely into two parts and connecting said parts by a hinge or joint, b, in connection with the plates, B, and screw, c, or an equivalent fastening, all arranged substantially as and for the purpose herein set forth.

Second, The combination of the pivoted hames, C C, plate, D, and strap, E, arranged and applied substantially in the manner as and for the purpose herein set forth.

[This invention relates to certain improvements in a horse collar for which Letters Patent were granted to this inventor bearing date July 17, 1860.]

41,498.—Chimney-flue.—W. J. Fryer, Jr., Albany, N. Y. Ante-dated Feb. 3, 1864.

I claim the employment and use in chimney flues, &c., of the tubes, B, made of clay or other suitable material with lips and projections, b, at the supporting points on the upper ends thereof, in combination with the crock, c, all made and applied in the manner and for the purpose as herein described.

[This invention consists in the use of cylindrical, polygonal or oval tubes of clay, plaster of paris and lime and water, fire-clay, or any

other suitable material, which tubes are built up in the square holes formed in the chimney in the ordinary manner and size. These tubes are provided with lips or projections at, the top ends, so that each length is independently supported and held firm in its place. The stovepipe hole is formed by a large hollow, clay-brick or crock made in halves and built in the chimney breast, so that the connection is not only complete but renders the use of flue collars unnecessary and altogether it is a decided improvement over everything in the way of stovepipe entrances ever before made.]

41,499.—Horse Hay-fork.—John S. Gage, Dowagiac, Mich. :

First, I claim the attaching of the ball, C, directly to the tines, A, of the fork in connection with cross-bars, B B', one or more, for securing the tines in proper position, substantially in the manner as and for the purpose herein set forth.

Second, The spring brace, F, connected to the ball, C, and provided at its lower end with a recess, l, in connection with the rod, m, in the arm, E, provided with the spur, q, and the lever, G, all arranged as and for the purpose specified.

[This invention relates, first, to a novel and improved mode of constructing the fork, whereby the ordinary head for the tines is avoided and the ball connected directly to the tines, and a very durable and desirable fork obtained. The finvention relates, second, to a novel and improved means for holding the fork in a proper position while being elevated with its load and for tripping the fork, so that it may discharge its load.]

41,500.—Air-gun.—Paul Gifford, Paris, France :

I claim the construction of air-guns in which all the compressed air is utilized; and the action thereof on the projectile rendered instantaneous, and with the air reservoir and air-pump arranged substantially as hereinbefore described.

41,501.—Lock-joint for Street Railways.—Wm. C. Gould, New York City :

I claim the method of connecting the ends of rails for city railroads so as to secure a continuous track, by causing one rail to lap upon and enter within another, substantially as described.

I also claim the use and application of the key, E, in combination with such laps, substantially as and for the purpose set forth.

41,502.—Car Coupling.—James M. Gow, Rock Island, Ill. :

I claim the combination of the draw-pin, B, when slotted and otherwise constructed, as herein shown and described, with the slotted draw-head, A, all the parts operating together, as set forth.

[This invention consists in a slotted draw-pin supported by a pivot in the upper part of the draw-head and projecting through a slot in the under side of the same, in combination with the ordinary coupling link, in such a manner that the link, on entering the draw-head will push back the draw-pin and allow it to catch between said link and shoulder in the under side of said draw-head, and in uncoupling two cars nothing is required but to raise the draw-pin in its slot high enough to release the link.]

41,503.—Construction of Hoes, Rakes, &c.—John S. Hall, West Manchester, Pa.:

I claim fastening a hoe or rake to a socket or pang by means of the collars and groove on the latter, and an oval or oblong opening in the former in connection with a key to hold them together, substantially in the manner herein described and represented.

51,504.—Boiler Feeder.—A. Hammond, Jacksonville, Ill.:

I claim the arrangement of the reservoir, B, and pipes, a b, with the boiler, A, cock, c, float and rod, f g, all in the manner herein shown and described

[This boiler-feeder consists of a steam-tight water reservoir or tank arranged above the boiler, and having its top and bottom connected therewith by two suitable pipes, in which there are stop-cocks, which are connected with a float in the boiler in such a manner that, when the water in the boiler gets below a certain level, the weight of the said float opens both cocks, and so places the water in equilibrio, and allows it to descend by gravitation into the boiler. As the water in the boiler rises, it raises the float, and gradually closes the cocks, shut-off the water when the boiler has been supplied to a proper level.]

41,505.—Postage or Revenue Stamp.—Emanuel Harmon, Washington, D. C.:

I claim, first, The employment of the same ink to cancel a letter or revenue stamp, which has been previously used to impress lines, a, upon the face of the stamp, substantially as and for the purpose described.

Second, In canceling a letter or revenue stamp, I claim the use of the same ink or coloring matter as that employed in printing the same or any essential part thereof, in the manner and for the purpose above described.

41,506.—Machine for cutting Bungs or Corks.—Peter Hayden, Pittsburgh, Pa.:

I claim, first, The combination of the two cutters, G G', bent bars, H H, groove, e, head, I, and yoke or cross-bar, M, with the hollow mandrel, F, slide, J L, and spring, K, arranged and operating substantially as and for the purposes specified.

Second, The plate, U, with adjustable sockets, y, and clamp bar, V, attached in connection with the stop, X, arranged substantially as and for the purpose set forth.

Third, The bolt-sustaining plate, Z, when used in connection with the plate, U, clamp bar, V, and stop, X, as and for the purpose specified.

Fourth, The combination of the rotary cutters, G G', plate, U, with the sockst, Y, and clamp bar, V, attached, the stop, X, cam, R, and slide, T, all arranged substantially as and for the purpose herein set forth.

[The object of this invention is to obtain a machine for cutting bungs for barrels and corks for bottles, which will be automatic in its operation throughout, no manipulation being required on the part of the attendant, except the applying of the bolts to the machine.]

41,507.—Self-rocking Cradle.—C. H. Helmkamp, Reading, Ohio :

I claim the combinatian of the spring box, A, gearing, a B C D, crank, L, pitman, E, rocking beam, G G', and rods, H H', constructed, arranged and operating substantially as and for the purposes set forth.

41,508.—Water Wheel.—Birdsill Holly, Lockport, N. Y.:

I claim the reservoir, c, bearing, d f, and conduit, g, in connection with the induction, B, beneath, substantially as and for the purpose herein set forth.

41,509.—Screw Tap.—James Howell and David Birdsall, Jersey City, N. Y.:

I claim, first, A screw tap having two heads, one or both of which are adjustable le..gthwise of the shaft, to bring the two at any required distance apart to tap simultaneously two opposite holes in two tube sheets or other pieces at any distance apart, true to a common axis, substantially as herein specified.

Second, Making such a double-headed tap with two squares or flattened portions for the reception of wrenches, one of said portions being upon the shaft, and the other upon the more distant movable head, substantially as herein described to prevent the torsion of the shaft.

41,510.—Adjustable Hammer for Many-barrelled Fire-arms.—R. J. Howland and W. H. Elliot, Ilion, N.Y.:

I claim, first, The employment of a movable piece, b, for giving motion to one or more revolving firing points, when said movable piece and points are attached to and swing back and forth with the hammer, and operating in the manner herein described.

Second, The employment of two revolving firing points, for firing a series of barrels arranged around a common center, as herein described.

41,511.—Window Guard.—James Hunnewell, Charlestown, Mass.:

I claim the combination of the two vertical strips placed on opposite sides of the window, with the cap and sill; the four pieces being arranged with reference to each other, in the manner and for the purpose herein described.

41,512.—Machine for finishing the Heels of Boots and Shoes.—Joseph L. Joyce, New Haven, Conn.:

I claim, first, The combination of the cutter-head, F, and revolving adjustable guide, i, substantially as and for the purpose specified.

Second, The combination of the cutter-head, F, former, d, and adjustable guide, f, in the manner and for the purpose described.

Third, The combination of the yoke, H, with the cutter-head, F, and adjustable revolving guide, i, substantially as set forth.

Fourth, The combination of the yoke, H, cutter-head, F, former, d, and adjustable guide, f, substantially as specified.

Fifth, The combination of the polisher, P, with revolving guide, i, in the manner and for the purpose specified.

Sixth, The combination of the polisher, P, former, d, and adjustable guide, f, for the purpose and in the manner described.

Seventh, The combination of the yoke, H, polisher, P, and adjustable revolving guide, i, in the manner and for the purpose set forth.

Eighth, The combination of the yoke, H, polisher, P, former, d, and adjustable guide, f, in the manner and for the purpose substantially as herein specified.

41,513.—Beehive.—Leonard Kennedy, Hartford, Conn.:

I claim the arrangement of the adjusting screws, g, upon the sides of the comb frames, as herein shown and described, so as to regulate the space between the frames at pleasure.

I also claim the arrangement of the entrance strips, F, with the hive front, in the manner herein shown and described.

[This invention relates to a peculiar arrangement of the comb frames of the hive, whereby the least possible surface of said frames are brought in contact with the hive or box in which they may be placed, and the frames rendered capable of being removed from the hive when necessary without annoying or exasperating the bees; the frames being also easily adjusted at a greater or less distance apart, as occasion may require, and with the greatest facility, and the frames at the same time, when adjusted in the desired position, held therein in a secure manner, so as to effectually avoid casual displacement.]

41,514.—Cider Mill.—Tobias J. Kindleberger, Springfield, Ohio :

I claim, first, The manner of arranging the bearings, R, of the roller, E, to wit, by having the same in slides, S, fitted in boxes, T, adjusted through the medium of screws, V, and retained in position by set screws, s*, all arranged substantially as set forth.

Second, The screw, J, provided with the nut, L, having the wheel, M, attached in combination with the pinion, l, on the crank shaft, N, and the anti-friction balls, k, all arranged to operate substantially as and for the purpose specified.

[This invention consists in the employment of three rollers and an adjustable pressure plate, constructed and arranged in such a manner as to operate very efficiently in crushing the apples and reducing the crushed parts sufficiently fine to favor the rapid and complete expression of the juice from them. The invention also consists in a novel and improved means for expressing the juice from the ground apples.]

41,515.—Process for finishing Woolen Fabrics.—Peter and George King, Greenfield, Mass.:

We claim the within-described combined process for finishing goods which consists in successively fulling and scouring the piece, then rolling and stretching the same, then subjecting it to a single gigging operation to raise the nap, then steaming, then scouring, tentering shearing, brushing and pressing, all substantially as herein set forth.

[This invention relates to the process of finishing what are termed "faced-goods," made of wool or a mixture of wool and cotton, and it not only same time and labor, and consequently reduce the cost of manufacture in that way and obtain an increase in the length of the finished piece with a superior luster, a better and fuller nap, and a softer and more silky fabric, and prevents what is technically termed "grayness."]

41,516.—Machine for drilling Iron.—Isaac S. Lauback, New York City :

First, I claim the combination of the drill spindle, E, screw, C, socket, d, adjustable head, A, and set screws, f f, or their equivalents, the whole constructed substantially as described.

Second, I claim the combination of the adjustable arm, D, with the adjustable head, A, and set screws, f f, substantially as described.

41,517.—Auger for boring Wood.—G. W. Low, Chillicothe, Ohio :

I claim the combination of the cutters, D, rectangular projecting arms, c, and grooves, h, in the head, A, when the said parts are constructed and arranged as herein specified, so that the action of boring will press the arms, c, into their grooves and thus retain the cutters securely in position without the aid of screws or keys.

[This invention consists in providing the bit or auger with knives or cutters constructed and applied in such a manner that they may be readily attached when necessary for the purpose of sharpening the same and putting them in cutting order.]

41,518.—Lock.—F. McCollum, Rockville, Conn.:

I claim, first, The arrangement and combination of the tumblers, N, provided with the pins, p, plates, m m, perforated and provided with the pins, p', annular plates, k, provided with the studs, l, and the collars, i, having perforations, j', made in them and fitted within the tumblers, N, all arranged in connection with the shaft, L', and perforated wheel, O, provided with the pin, w, to operate as and for the purpose specified.

Second, The sliding arbor, I, having a plate, K, attached to it provided with projections, h h, in connection with the disk, L, provided with recesses, g, and having the wheel, P, attached to it, all arranged as shown in connection with the wheel, O, for communicating motion to the tumblers, N, and plates, m m.

Third, The bar, C, provided with the pendent projections, v v v, and attached to the arm, E, on shaft, F, in connection with the spring, G, and plate, K, on the arbor, I, provided with the beveled edge, e', substantially as and for the purpose specified.

Fourth, The bar, H, provided with the projection, e, and fitted on the pin or stud, d', and connected with the bolt, B, as shown, in combination with the perforated plate, K, on the sliding arbor, I, all arranged as shown, for admitting of the arbor being connected with and disconnected from the bolt, as set forth.

[This invention relates to a new and improved burglar-proof lock of that class in which the tumblers are adjusted in proper position to admit of the moving of the bolt through the medium of letters, figures, or other marks on the outer side of the lock case, to serve as guides or indices. The object of the invention is to obtain a burglar-proof lock which will admit of the tumblers being adjusted in different positions to effect "changes," as it is commonly termed, so as not to admit of the lock being opened at all times by one and the same movement and adjustment of the bolt arbor, and at the same time obtain a simple and efficient means for effecting this result.]

41,519.—Grain-cleaner.—Emanuel Mantz, Frederick, Md.:

First, In combination with the fan, C, I claim the box, E, provided with the door, U, chamber, S, troughs, Q and Q2, conducting table, Q', and air passage, O, all constructed and arranged in the manner described, to separate the loose refuse from the grain previous to being submitted to the action of the rubbers.

Second, I claim, in combination with the above parts, the rubbing apparatus, H H' I I1, constructed and operated as described and employed in connection with the perforated plates, K and m, and passage, O, to carry off the dust as fast as rubbed from the grain.

Third, I claim, in a machine constructed as specified, the mouthpiece, L, arranged as described, for limiting the discharge of grain from the rubbers, I, and causing it to enter the passage way, O, in a quantity equally distributed therein.

Fourth, I claim the combination of the eccentric, c, arm, F, lever, F', and spring, g, all arranged as described, to operate the screen, G, as set forth.

[This invention consists in a novel construction of rubbing apparatus and in a peculiar manner of applying a fan blast, whereby the grain may be thoroughly cleaned of adhering dust and all the useless refuse carried off in a body.]

41,520.—Wagon Spring.—Charles S. Martin, Mackford, Wis.:

I claim, first, The combination of the spring, A, bolts, B B, clasp or hanger, C, cup, D, and washer, E, in the manner and for the purpose herein described.

Second, In combination with the foregoing I claim the coupling, H and G, in the manner and for the purpose herein described.

41,521.—Fire-proof Safes, &c.—Walter K. Marvin, New York City :

First, I claim as a new composition of matter for the fire-proof lining or filling of safes and other like fire-proof structures, alum, gypsum, and clay, combined in the manner hereinbefore set forth.

Second, I claim the coating of lumps of alum with calcined and powdered gypsum, as described, in combination with incorporating such coated lumps in dry or calcined clay, substantially in the manner and for the purpose set forth.

Third, As a new article of manufacture I claim safes or other fire-proof structures, the filling of which is composed of alum, gypsum and clay, under the arrangement or combination hereinbefore set forth.

41,522.—Raking Attachment for Harvesters.—Albert E. McGaughey, Red Wing, Minn.:

I claim the means employed for moving the rake in the arc of a circle forward and back over the platform and rotating the rake during said movement, to wit, the rock-shaft, H, provided with a toothed segment, I, the rack, M, on the platform, wheel, J, on shaft, with the pinion, N, bosses, c c', on rake head, L, slide rods, d d', and notched plates, f f', all arranged to operate substantially as and for the purpose specified.

[This invention consists in applying or arranging an automatic rake for harvesters in such a manner that the former will, at the commencement of its working or raking movement set in or commence at the side of the platform which is next to or adjoins the standing grain and sweep over the platform in the path of a circle and discharge the grain in a gavel at the rear of the platform, and then in moving back to its original or standing position, revolving so as to clear the cut grain as it falls upon the platform, and adjust itself in a proper working position as it reaches the point where its working movement commences.]

41,523.—Cultivator.—Patrick McGlew, Des Moines, Iowa:

I claim, first, The two plow standards, H, H, fitted in the metal plates G, and connected to the front part of the frame, A, by bars, K, in connection with the handle I, attached to the bars a, d, which are fitted to the standards H, as shown to operate as described.

Second, The plow standards L, L, connected to the front part of the frame A, by the bars N, and fitted between the guides s, and secured between them by the plates u, and bars u', t, in connection with the bar o, attached to the bars N, by the rods u, and connected to the levers, by the rod, R, all arranged to operate as set forth.

[This invention relates to a new and improved cultivator of that class designed for plowing crops at each side of a row simultaneously. The invention consists in a novel and improved means employed for elevating the front part of the machine, and the manner of arranging the plows and scrapers, whereby the several parts are put entirely under the control of the operator, and a very efficient device for the purpose obtained.]

41,524.—Thill Fastening.—Samuel S. Melley, Lebanon, Pa.

I claim, first, The application of a looped fastening, D, to the removable coupling bolt C, substantially as described.

Second, A pivoted spring looped fastening D, constructed with a forked end, in combination with a bolt C, constructed with an enlarged shoulder on one end, adapted to enter eye a' and a tenon d, on the opposite end adapted to receive and to form a lateral support for the free end of the loop, substantially as described.

Third, The combination of clip eyes a, a,' bolt C, thill eye b, and loop fastening D, constructed and operating substantially as described.

41,525.—Churn.—S. H. Merredith, Oxford, Ohio :

I claim the shaft, K, the circular dasher, M, and the bed piece, N, the whole constructed and arranged in the manner and for the purpose substantially as herein set forth.

41,526.—Invalid Bedstead.—Daniel Merrill, Worcester, Mass :

I claim first, The combination for regulating the upper or head section of the jointed frame, the same consisting in one or more struts, b, the belt or cord, x, and windlass with pulley, p, arranged and combined with the bedstead and jointed frame in manner specified.

Second, I claim the combination by which the simultaneous elevation and depression of the two lower sections of the jointed frame is effected, the same consisting in the windlass and pulleys p2, the two cords or belts y, and g, and the struts 12, arranged and applied at the lower or knee joint of the jointed frame substantially as specified.

Third, I also claim the combination for distending tacking or its equivalent, the same consisting in the struts 12, which act as levers, the fulcum bar g, and the rod r, provided with nuts and screws v, the whole being arranged and combined to operate in the manner set forth.

41,527.—Sewing Machine.—Warren Millar, Chicago, Ills. Ante-dated Feb. 3, 1864.:

I claim, first, Turning the heel of the bobbin away from the rotating hook, and, supporting it on the slide ring in the manner and for the purpose substantially as described.

Second, In combination with an eye-pointed needle, and the rotating-hook of a sewing machine, the strap s, and the bobbin m, or its equivalent, when made to check or control the loop of thread, in the manner substantially as described.

41,528.—Means for attaching Hooks to Furniture.—Agatha Montjeart, Mildmay Park, and Wm. Teni, London, England. Patented in England, July 16, 1863.:

We claim the combination of a hook a, or eye d, with the spring fastening b, c, c', as and for the purpose herein set forth.

41,529.—Shaft Coupling for Carriages.—Francis B. Morse, New Haven, Connecticut. :

I claim a coupling for carriage shafts, in which the movable part of the joint has the eyes forged thereon, and a cavity in its rear end to receive an elastic presser, to prevent rattling as herein described.

Second, I claim the combination of the head, or movable part of the joint, as described, with the stationary jack and elastic presser, substantially as hereing described.

41,530.—Means for the Protection of the Anchor Cables of Iron-clad Vessels.—Isaac Newton, New York, N. Y.:

I claim first, Constructing or arranging the hawse-hole of an iron-clad vessel, within the armor shelf or behind the armor and within the wooden backing thereof, in such a manner that it emerges below the water line substantially as herein specided.

Second, The iron hood F, for protecting the cable where it passes over the deck between the upper end of the hawse-hole, the place where it passes through the deck, to and from a hoisting apparatus below the deck, substantially as herein specified.

41,531.—Lubricator.—Edward Painter, East Hampton, Mass.:

I claim an oil can provided at its upper part with a chamber, D, perforated at its top and bottom with holes, a b, substantially as and for the purpose herein set forth.

41,532.—Fruit Jar.—Samuel J. Parker, Ithaca, N. Y.:

I claim, first, so shaping the neck of the jar, by a construction above the ring, that the stopper shall snap or automatically close, and be retained by the constriction, as the jar is closed as described.

Second, I claim the special device of a capsule of vulcanized rubber cloth clamped over the cork core, substantially as described.

Third, I claim corrugating or otherwise roughening the inside surface of the jar cover cap, and also of the outside of the neck of the jar, so the corrugations shall retain the cover in place as described, and the same mutual corrugation of the same relative surfaces in all sorts of jars, as described.

Fourth, I claim the flat cam inclination, j j a, of the lower surface of the stopper, as described.

41,533.—Spring-bed Bottom.—Lyman E. Payne, Disco, Mich.:

I claim the employment or use of straps, E, in combination with the springs, C, slats, D, and bedstead, A, all constructed and operating in the manner and for the purpose substantially as shown and described.

[This invention consists in combining a series of elastic slats and rubber springs with separate cross pieces detached from the head and foot rests of the bedstead in such a manner that said head and post rails are prevented being sprung out of shape by persons laying on the bed.]

41,534.—Fountain Pen.—Joseph Reid, Fort Wayne, Ind.:

I claim the arrangement of the ring valve, e, with the capillary tube, b, the pen, B, and fountain, A, in the manner herein shown and described.

[This invention relates to a new and improved fountain pen, those which are provided with an ink reservoir within a case and arranged in such a manner as to be self-feeding or self-supplying. The invention consists in the application to the ink fountain of a capillary tube provided with a valve and ink-conductor, and placed in such relation with the pin as to form a simple, efficient and economical article of the kind specified.]

41,535.—Artificial Leg.—H. D. Reinhardt, Baltimore, Md.:

I claim, first, The peculiar shape of the hinge Fig. 6, with a thread cut on the pin projecting from the upper part of the hinge, and a nut to suit the thread, also a bolt or screw, Fig. 11, cut to suit the thread in the flanch, for the use and purpose of connecting the foot and leg together.

Second, I claim the arrangement of India-rubber, C, under the projection letter, G, Fig. 7, in a recess cut out for the purpose in the line of the metatarsal joints, and to act as a spring to keep the toes in their proper place and give to them their natural motion.

Third, I claim the arrangement of the blocks of India-rubber, A and B, as seen in Fig. 1, side sectional elevation, and used as springs to give the ankle joint a natural motion in combination with the peculiar shape hinge Fig. 6, and fitted in a recess above and near the ankle joint, resting below on the flanch of the hinge, one block on each side as seen in Fig. 1, side sectional elevation in the cavity of the foot, constructed, arranged, and operated substantially as herein set forth.

41,536.—Puzzle for Children.—W. B. Rice, Feltonville, Mass.:

I claim the employment or use of a series of blocks, A, marked on one side with a series of letters or figures, and on the opposite side with parts of a picture; said letters to form the key for the picture, substantially as and for the purpose shown and described.

Also as a new article of manufacture, the alphabet blocks, puzzle, and cottage, combined as herein specified.

[This invention consists in the employment or use of a series of blocks marked on one side with parts of a certain picture such as the doors and windows of a cottage, and on the other side with a consecutive series of letters or figures, such as the consecutive letters of the alphabet in such a manner that the letters or figures on one side form the key for the picture on the opposite side, and by following said key the blocks can be readily arranged or put up in the proper order so as to exhibit the picture.]

41,537.—Oil Can.—Eliphalet S. Scripture, Brooklyn, N. Y.:

I claim the use or employment of the screw seat cup, B, in combination with the body, A, and spout, C, constructed as shown for the purposes fully set forth.

41,538.—Disintegrating and separating Vegetable Fibers.—George Escol Sellers, Sellers Landing, Ill.:

I claim, first, The maceration of green vegetable substances under pressure from heat, combined with the incidental volatilization, to prepare them for the separation of the fibers from each other and from the non-fibrous portions of the plant.

Second, The loosening or disintegration by mechanical pressure, of the fibers and of the non-fibrous matter, so that by washing a complete separation may be effected, and both the fibrous and the non-fibrous portions may be preserved in their greatest integrity.

Third, The arundine or lignin, when separated from the cellulin, without other chemical agencies than heat and moisture, as a new article of commerce.

41,539.—Gig Saw.—Henry F. Shaw, West Roxbury, Mass.:

I claim, first, Revolving the sash or gate, by which the saw is strained and carried up and down, on a fixed axis around the saw, so that the stock, however long, may be turned, substantially as described.

Second, In combination with said revolving gate, or sash, the employment of a spring, N, substantially as set forth and for the purpose described.

41,540.—Knitting Machine.—Edward Shore, Conshohocken, Pa.:

I claim the block, D, with its projecting ledge, b, or their equivalents, when arranged in respect to the needles and lifting wheel of a rotary knitting machine, substantially as and for the purpose herein set forth.

41,541.—Fence Post.—Charles R. Smith, Haverhill, N. H.:

I claim, first, The foundation, E, formed of slabs, e*, of tiles, factitious stone, or any baked earthy cement, placed together in V-form, substantially as shown and described.

Second, The combination of the foundation, E, with the posts, A, braces, D D, bars, C, and the wires, d, or their equivalents as and for the purpose herein specified.

41,542.—Drain.—George W. Smith, Springfield, N. J.:

I claim as a new article of manufacture the combination of the cottom drain plates or slabs, A, with the grooves, C C, and the two inclined plates or slabs, B D, constructed and put together substantially as described.

41,543.—Pump Valve.—Nathan Stedman, Aurora, Ind.:

I claim the arrangement of the hollow piston, E, having the side perforation, G, and double-acting disk valve, I I, seating alternately on apertures, F and F', at the top and bottom of the piston, and confined to a motion in the line of its axis by a stationary rod, J.

41,544.—Method of hanging Saws.—R. L. Stewart, Owasso, Mich.:

I claim the pitman, I, and pitman, G, when constructed to operate together in relation to the saw in combination with the cam, J, projection, e, convex plates, g and h, and cross bar, I, substantially as described and for the purposes set forth.

41,545.—Surface Condenser.—Alban C. Stimers, New York City:

I claim making the tube plate of a surface condenser so thick that a water-tight slip joint can be made around the tubes by a simple parallel expansion of them in the plate, and without the aid of stuffing boxes or other similar devices, substantially as described.

41,546.—Drill.—Wm. Stivers, New York City:

I claim as a new article of manufacture the hand drilling machine constructed substantially as hereinbefore described.

[The object of this invention is an improvement on that class of boring or drilling machines, which are provided with a vertically adusted carriage, furnished with arms to form the bearings for the bore spindle, and with an adjustable table, and which are particularly intended to drill holes of various depths, by hand, in wood or metal.]

41,547.—Reflector for Gas Lights, Lamps, &c.—James Stratton, Brooklyn, N. Y.:

I claim as an improved article of manufacture a reflector for gas lights, lamps, &c., having a body of cast or wrought metal with an enameled inner or reflecting surface, substantially as herein set forth.

[The object of this invention is to obtain a reflector for gas lights' lamps, &c., which will have a durable reflecting surface, one not capable of becoming tarnished and which may be kept in a clean state without any difficulty whatever.]

41,548.—Machine for treating Curved Spines.—Charles F. Taylor, New York City. Ante-dated Feb. 3, 1864:

I claim the two bars, C I, connected together by the bars, G H, so as to form a joint the bar, C, being fitted in a plate, B, or arranged in any other suitable manner so as to be adjustable, and the bar, I, provided with an adjustable plate, J, having the paddled projection, L, and the adjustable paddled slide, K, fitted to it, the above parts being used in connection with the cord, M, and the arm, D, and counterpoise, E, all arranged substantially as and for the purpose set forth.

[The object of this invention is to obtain a machine of simple construction which will operate in the most efficient manner for exercising certain muscles of the back in order to correct lateral curvature of the spinal column. To this end the invention consists in the employment or use of two oscillating or vibrating bars, one of which is adjustable and the other provided with an adjustable plate, having adjustable pads attached to it; the two bars aforesaid being connected by a jointed frame and the lower bar connected by a hinge or joint to the base of the machine, an arm and counterpoise; all being arranged in connection with a cord and pulley, to operate in a perfect manner.]

41,549.—Barometer.—John Thomson, Wayne, Ill.:

I claim the application of a small globule of mercury, to form a movable stopper or partition within a tube of small bore, and therein acting as a barometer either by itself, or in combination with the well-known mercurial barometer, and thereby forming a weather glass.

41,550.—Cultivator.—P. W. Thomson, Truro, Ill.:

I claim the combination and arrangement of the plow beams, E E, pivoted at x x, the standards, N N, the cross bar, F, provided with the pads, a a, and the lever, L, all constructed and operating substantially as and in the manner set forth.

41,551.—Connecting Tin Tubing.—A. R. Treadway & S. R. Warner, New Haven, Conn.:

We claim the application of tin tubing to the purpose of heating by steam, when the different sections of the same are united by soldering to the parts of the couplings, substantially as herein specified.

41,552.—Shingle Sawing Machine.—William H. Walker, Fond du Lac, Wis.:

I claim first, The arrangement of a circular saw, in horizontal position, between two stationary bolt holders, or rectangular frames R R, between which it is driven to and fro in the sliding frame F, to cut a shingle at each reverse movement in the manner herein explained.

Second, The wheels C, C', provided with friction rollers h, h, in combination with the plate I and operating in the concaves G, G, when arranged substantially as and for the purpose set forth.

Third, The movable bar D, provided with recesses l, l, and arranged substantially as shown, in relation with the shafts c, c', for the purpose of raising and lowering the same to render the frame F, automatically operative, as may be desired.

Fourth, The tilting frames M, arranged as shown on the frame F, and provided with the plates N, having pawls O', attached in connection with the bars O, provided with the triangular cams Q' and ratchets Q, all arranged to operate, as shown, for the purpose of inclining the bolts, so that the shingles may be sawed in taper form, and drop from their place.

Fifth, The arms T, attached to the sliding frame F, in combination with the weight U, or its equivalent for the purpose of operating the sliding dogs S, when used in connection with a circular saw mounted in a reciprocating carriage as set forth.

Sixth, The double wedge A', placed on the upper part of the framing A, and arranged to operate by the movement of the saw frame F, substantially as and for the purpose specified.

[This invention relates to a new and improved shingle machine of that class in which saws are employed for cutting the shingles from the bolt. The invention consists in a novel means employed for feeding the bolt to the saw, and also in a novel means for adjusting the bolts whereby the same may be presented to the saw so that the shingles will be cut in taper form and the feeding device be capable of being operated either automatically or by hand as may be desired.]

41,553.—Washing Soap.—Henry Warren, Goshen, Ind.:

I claim the new article of manufacture, a soap made of the ingredients above described, in the manner and in the proportions substantially as set forth.

41,554.—Wrench.—William Webster, Morrisania, N. Y.:

I claim the employment of an ordinary wrench with an aperture in the movable jaw thereof, in combination with a distinct and separate bit for cutting or clasping, which may be adjusted to said jaw and charged at pleasure by means of said aperture, substantially as described.

Second, The manufacture and use of the clasp C, and the cutter B, when constructed as described.

Third, The cutter B, or clasp C, when made separate from the wrench and combined therewith substantially as set forth.

Fourth, I claim in combination with a wrench constructed substantially as described, a clasp, knife, or cutter upon the face of a movable jaw thereof, whether said clasp, knife or cutter be in one piece with, or made separate from, said jaw, for the purpose set forth.

41,555.—Cultivator.—Samuel G. Welch, Athens, Ill.

I claim the bar F, having the draft pole G, attached, supported by the caster wheels I, I, and connected to the frame A, by levers D, D, the back ends of which are connected to the bar E, having a lever H, secured to it and all arranged so as to admit of the raising and lowering of the plows and the latteral adjustment of the draught pole rolatively with the body or main portion of the machine as set forth.

41,556.—Harvesting Machine. (A.)—Cyrenus Wheeler, Jr., Poplar Ridge, N. Y.:

I claim the gear block, carrying a gear wheel, constructed in the form and operating in the manner substantially as described.

I also claim making the main frame when constructed in one piece with three bearings for the main axle, substantially as and for the purpose described.

I also claim the combination of the sleeves of the gear block with the journal boxes of the main frame when the gear block and sleeves are constructed in one piece, substantially as described.

I also claim the segment rib on the sleeve of the gear block in combination with the lip on the main frame, for preventing lateral play to the gear block, substantially as described.

I also claim connecting the tongue to the gear block constructed in one piece by a recess formed in the gear block on its under side, for the purpose of lowering the draught, substantially as described.

I also claim the combination of the standard and brace-rod for additional support to the main frame, substantially as described.

I also claim the two ears on the lower side of the rear corners of the main frame, in combination with the long bolt, for the purpose of connecting the hinge piece, and as an additional support to the rear part of the main frame, substantially as described.

I also claim the combination of the lifting devices mounted on the standard of the gear block, and the standard on the main frame, united by a flexible connection, substantially as described.

I also claim the combination of the weighted dog with the lifting device, so as to hold the lifting device in a fixed position when the main frame is raised, and so that the operator can with his foot release the dog from the lifting device at pleasure for the purpose of lowering the main frame, substantially as described.

I also claim mounting two driving wheels, the main gear wheel, and the bevel wheel on the main axle, substantially as described.

I also claim mounting the main gear wheel, bevel wheel and pinion locking with it, on the main axle, substantially as described.

I also claim communicating motion from the main gear wheel to the bevel wheel on the main axle, by a shaft mounted in bearings on the gear block carrying a pinion gearing with the main gear wheel, and a spur wheel gearing with the pinion on the main axle, substantially as described.

I also claim the combination of gearing, whereby the bevel wheel and its pinion mounted on the same axle with the main gear wheel shall revolve in the same direction as the main gear wheel, substantially as described.

I also claim mounting the bevel wheel having a sleeve provided with a clutch, and the pinion having a sleeve and clutch both on the main axle, and so arranging and combining them with the main frame and gear block, as that the pinion may be moved longitudinally on the main axle for the purpose of clutching the pinion with, and unclutching it from the bevel wheel, substantially as described.

I also claim mounting the bevel wheel on a sleeve on the main axle, in combination with the main frame vibrating independent of the gear block and carrying a counter shaft having a pinion gearing with said bevel wheel, substantially as described.

I also claim the arrangement of the lever, slide and spring, by which the clutching and unclutching of the pinion with the bevel wheel is performed, substantially as described.

I also claim in combination with a main frame vibrating independently of the gear block, mounting the foot-board and seat on the gear block, and fastening the tongue to the under side thereof, substantially as described.

I also claim the longitudinal lever fastened to the gear block in combination with the transverse lever pivoted to the shoe for the purpose of raising the outer end of the cutting apparatus, substantially as described.

I also claim the combination and arrangement of the longitudinal and transverse lever with the gear block, main frame, and cutting apparatus, so that the cutting apparatus can be folded up and fastened, without detaching any part of the machine, substantially as described.

I also claim the combination and arrangement of the lifting devices with the gear block and main frame, and the longitudinal and transverse levers with the cutting apparatus, so that the cutting apparatus may be raised from the ground at pleasure by the operator from his seat, substantially as described.

41,557.—Harvesting Machine. (B.)—Cyrenus Wheeler, Jr., Poplar Ridge, N. Y.:

I claim the combination of the triangular frame with the main frame substantially as set forth, with a seat and lifting device mounted thereon, so that by the arrangement of the transverse lever with the triangular frame and cutting apparatus, the driver can when in his seat raise the cutting apparatus from the ground at pleasure, substantially as described.

I also claim the combination and arrangement of the triangular frame, with the main frame, transverse lever, and cutting apparatus, so that the cutting apparatus when divested of the reel and platform, may be folded up and fastened without removing any part of the machine, substantially as described.

I also claim the combination and arrangement of the two seats, and the two lifting devices, with the other parts of the mechanism with which they act, so that the operator can when occupying either seat on the machine raise the cutting apparatus at pleasure, substantially as described.

I also claim the triangular frame carrying the seat and lifting devices so arranged and connected to the main frame that it with the seat and lifting devices mounted thereon can be detached from the main frame at pleasure without interfering with the organism of the machine, or its effectiveness as a mower, substantially as described.

41,558.—Harvesting Machine. (C.)—Cyrenus Wheeler, Jr., Poplar Ridge, N. Y.:

I claim the construction of the outside shoe with a flange for connecting it to the outer end of the supporting bar, in combination with an ear or flange for connecting the other end of the bar firmly to the inner shoe, substantially as described.

I also claim driving a reel that has its support on a hinged cutting apparatus or table, by an endless band passing from the driving pulley over the sheaves or pulleys arranged near the foot of the inner reel support, so that the variation of the reel pulley relatively to the driving pulley, caused by the varying positions of the cutting apparatus and platform in passing over uneven ground, shall not change the tightness of the band, or cause it to be thrown from the driving or driven pulley, substantially as described.

I also claim the arrangement of the cutting apparatus and platform in combination with the reel band arranged over the pulleys at the foot of the inner reel support so that the cutting apparatus pivoted to the main frame can be rotated on its axis at the pleasure of the operator without changing the length of the band or interfering with the operations of the reel supported on the cutting apparatus, substantially as described.

I also claim the arrangement of the reel bands, the pulleys, and the reel, having its support on the hinged cutting apparatus in relation to the driving pulley and the main frame, so that the cutting apparatus can be raised for cutting any desired hight, and the points of the cutters elevated or depressed at pleasure without varying the tightness of the band or interfering with the motions of the reel, substantially as described.

I also claim sustaining the inside reel support by both the table bar and the shoe, substantially as described.

I also claim supporting the reel shaft by three bearings, said reel shaft and bearings being all arranged on the hinged portion of the machine, substantially as described.

I also claim making the outer bearing on the outer reel post, and the outer reel post itself for supporting the reel shaft, self-adjusting in relation to the other reel shaft supports, substantially as described and represented.

41,559.—Harvesting Machine. (D.)—Cyrenus Wheeler, Jr., Poplar Ridge, N. Y.:

I claim in combination with the track-board, the standard on the tongue, as a fastening for the cutting apparatus when folded up, substantially as described.

I also claim in combination with a shoe which has a support for the grass or grain both above and below the cutter, the ledger plate connected with it and held firmly in place by the finger bar, substantially as described.

I also claim in combination with a guard finger having a support for the grass or grain both above and below the cutter, the ledger plate locking with it as described (said ledger plate having a shape so arranged that it will lock under the edge of the finger bar, when the guard finger is in place, and the bolt fastening it to the finger bar holds both the guard and the ledger plate in position), a cutter, the bar of which is on its under side, and is placed over the finger bar, substantially as described.

I also claim in combination with the cutting apparatus the arrangement of the several parts composing the swivel connections of the pitman and crank, for operating said cutting apparatus, substantially as described.

41,560.—Folding Saw-horse.—Enoch Whittemore, North Paris, Maine:

I claim the portable folding saw-horse as made of the two jaw frames, A B, and the brace frame, D, arranged and combined together in the manner and so as to operate substantially as specified.

And I also claim the improved folding saw-horse, as made not only of the two jaw frames, A B, and the brace frame, D, but with the folding platform, F, the whole being substantially as specified.

And I also claim the portable folding saw-horse as made, not only of the two jaw frames, A B, the brace frame, D, and the folding platform, F, but as having a spring, G, or its equivalent applied to the platform and so as to operate one of the jaw frames in manner as specified.

41,561.—Box or Case for Oil-stones.—G. O. Wichers, Lawrence, Mass.:

I claim a box or case for oil-stones composed of two cast-metal parts, A B, one of which A, is provided internally with projections, a b, and a set screw, C, or its equivalent for holding the stone in position and admitting of an oil passage all around it, and the other, B, made to serve as a cover, substantially as set forth.

I further claim the knife-edged projections, c d, when used in combination with and formed on or cast with the parts, A B, for the purpose specified.

41,562.—Cultivator.—Joseph Wilhelm, Muscatine, Iowa:

I claim having the arms, a a, jointed at the center, and combined with the clevis, c, in the manner and for the purpose herein shown and described.

I also claim the arrangement of the spring latch, g, with the beam, A, and arms, D D, in the manner and for the purpose herein shown and described.

[This invention relates to an improvement in that class of cultivators which are constructed with two wings hinged together and arranged so that they straddle one row and that they can be expanded or contracted at pleasure, according to the width of the furrows through which the cultivator is intended to pass.]

41,563.—Bearing for Car Axles and Shafting.—Christopher Williams, Adrian, Mich.:

I claim a bearing for car axles, and the shafting of machinery generally, composed of two parts, A C, one of which is provided with a projection, B, in the form of a section of a sphere, and the other provided with a corresponding recess, D, to receive the projection, B, substantially as and for the purpose herein set forth.

[This invention consists in constructing the bearing of two parts

one of which is provided with a projection in the form of a portion of a sphere, and the other part provided with a corresponding cavity to receive said projection, whereby the bearing is made or allowed to adjust itself to the shaft, in case the latter assumes an inclined or an oblique position. The invention is especially applicable to railroad car trucks, which in consequence of being frequently strained, leave their axles more or less inclined, which contingency with the ordinary bearings cause the journals to heat. The bearings of any shafting frequently wear unevenly in which case the journals are sure to heat with the ordinary bearings, a difficulty which is fully obviated by my invention.]

41,564.—Mode of discharging Vessels.—Garret E. Winents, New York City:

I claim the raised platform, f, extending over the space occupied by the car or cart, in combination with the hinged plank, g, extending to the vessel containing the earth, manure, or similar material, for the purpose and as specified.

41,565.—Separating and collecting Gold and Silver Amalgams.—S. W. Wood, Cornwall, N. Y.:

I claim separating the amalgam from the pulverized rock by centrifugal force imparted to the vessel in which it is contained, the same acting in conjunction with gravity to gather and collect in a mass, the amalgam at the periphery of the vessel, substantially as herein specified.

I also claim introducing the material through the spout, D, or its equivalent, so as to bring it to the bottom of the vessel before being subjected to the centrifugal action thereof.

I also claim discharging the refuse rock and the water by overflowing at the upper edge of the vessel, the said overflowing being produced by the centrifugal force acting against that of gravity, substantially as herein set forth.

I also claim the annular troughs, ledges, or plates, on the inner periphery of the revolving vessel, substantially as and for the purpose herein set forth.

41,566.—Harvester.—Alden B. Briggs (assignor to himself and Dexter Childs), South Deerfield, Mass.:

I claim in a harvesting machine having two driving wheels, a compound frame consisting of an outside frame and an inside frame, and both frames connected to the axle of the driving wheels, the finger bar being attached to the outside frame, and located forward of the driving wheels, and the draft pole being attached to the inside frame so that when the finger bar is folded, it will cross the draft pole, and hold the two frames together as set forth.

41,567.—Water Whee.- Roswell R. Brooks (assignor to himself and G. H. Horton), Weedsport, N. Y.:

I claim the combination of the gate, E, with the extremity of the partition plate, C, in the manner herein shown and described, so that when said gate is open it will form a continuation of the plate, C, and will at other times simultaneously regulate the flow of the water through both of the compartments, c c', all as set forth.

[This invention relates to a new and improved water-wheel of that class in which the wheel is placed on a vertical shaft, enclosed within a scroll and the water discharged at the outer part of the wheel instead of at the center.]

41,568.—Neck Scarf and Collar Supporter.—James A. Bushee (assignor to himself and George R. Eager), East Boston, Mass.:

I claim a collar and scarf supporter made substantially as described and combined with a collar and scarf, in manner and for the purpose as explained.

41,569.—Cultivator.—Arlon M. Cook (assignor to himself, Artemas B. Vant & Horace Cook), Chicago, Ill.:

I claim, first, The comounation and arrangement of the evener, B, the bent levers, a a, and the draught rods, c c, with draught pole, A, and axle, H, all arranged and operating substantially as and for the purposes herein delineated and set forth.

Second, I claim the combination and arrangement of the U-shaped strap, d, the anti-friction roller, f, and the staple, e, with the adjustable bars, F, and the levers, I, constructed with a curved end, substantially as and for the purposes herein shown and specified.

41,570.—Spring Rocking-horse.—Jesse A. Crandall (assignor to Mary Crandall), New York City:

I claim mounting the horse or equivalent riding frame on a rocking shaft mounted substantially as herein described in combination with the springs placed in front and behind the rocking shaft, substantially as herein described, the spring or springs on one side of the rocking-shaft yielding to and resisting the impulse given in one direction, and the spring or springs on the opposite side yielding to and resisting the impulse given in the opposite direction, substantially as specified.

And I also claim connecting the horse or equivalent rocking frame, with the arms of the rock-shaft or equivalent thereof, at one end, by a hinged or turning joint, and by a notched sector, or equivalent thereof, substantially as described, by means of which the inclination of the horse or riding frame relatively to the base frame, can be readily increased or decreased, as set forth.

41,571.—Box Plane or Scraper.—A. F. Cushman, Hartford, Conn., assignor to Horace B. Langdon, New York City, and Rollin J. Ives, Bristol, Conn.:

I claim a box plane or scraper constructed with a cast-iron stock, A, adjustable knife, D, and screw clamp, E, all as herein shown and described.

[This invention consists in a box plane or scraper with a cast-iron curved stock and slotted grooved head, to which the knife is secured by a screw clamp in such a manner that the same can be adjusted to take fine or coarse chips, and that it can readily be taken out and sharpened or replaced by another. Said knife is made with four cutting edges, each of which can be brought in a working position. For information in regard to this invention address H. B. Langdon, 13 Park Place, New York City, or R. J. Ives, Bristol, Conn.]

41,572.—Sewing Machine.—Albert Eames & Clark Marsh, Bridgeport, Conn., assignors to the Wheeler & Wilson Manufacturing Company:

We claim the combination of an eye-pointed needle, and a bobbin with a rotating hook so shaped substantially as described, as to have the mode of operation substantially as herein set forth, whereby a pad is dispensed with in making a lock or shuttle stitch.

41,573.—Lock.—Henry H. Elwell, South Norwalk, Conn., assignor to the Norwalk Lock Company:

I claim the peculiarly-shaped lever, E, pivoted to the lock case as described, in combination with the hub, D, spring, F, and latch-bolt, C.

[This invention relates to an improvement in the means employed for actuating the latch-bolt, whereby a better leverage power is obtained than by the old plan or arrangement and a more uniform spring allowed to be used and a very desirable lock obtained.]

41,574.—Hand-car Crank.—Philipp Groel, Meadville, Pa., assignor to L. E. Holden, Cleveland, Ohio:

I claim, first, The reversible ratchet, B B, made in the manner and for the purpose substantially as specified.

Second, The piston, C C, made in the manner and for the purpose substantially as specified.

Third, A reversible hand-car crank composed of the following devices, the notched flange, A A, the reversible ratchet, B B, the piston, C C, in combination with a spring either elastic or metallic, a lever arm or common crank connected with a shaft to which power is to be communicated, substantially as specified.

41,575.—Fruit Jar.—Elbridge Harris, Boston, Mass., assignor by mesne-assignments to Wm. W. Lyman, West Meriden, Conn.:

I claim, first, Forming a groove or depression in or around the neck of a vessel, for the retention of an elastic ring or band (impervious to air), substantially as and for the purpose described.

Second, I claim the employment of an elastic ring or band, when used between the rim of a cover and the neck of a vessel, substantially as and for the purpose described.

Third, I claim as a new article of manufacture, fruit jars composed of the rim cap, G G', elastic ring or band, B, and jar or vessel, D, substantially as and for the purpose described.

41,576.—Composition for Gunpowder, &c.—Edward Harrison (assignor to R. W. W. Simpson), New York City:

I claim the gunpowder or explosive compound herein described, composed of ordinary gunpowder and amorphous phosphorus.

[By this invention the strength of gunpowder is very much increased.]

41,577.—Inflammable Composition for filling Projectiles.—Edward Harrison (assignor to R. W. W. Simpson), New York City:

I claim the within-described inflammable or incendiary compound composed of gunpowder, amorphous phosphorus, and bi-sulphide of carbon.

[This compound is intended for incendiary shells. It can be made to burn more or less slowly by varying the proportions of its component parts.]

41,578.—Explosive Composition.—Edward Harrison (assignor to R. W. W. Simpson), New York City:

I claim an explosive compound composed of chlorate of potash, charcoal, prussiate of potash, and starch of flour, with or without cyanuret of zinc, substantially as herein specified.

[This compound is said to be much stronger than ordinary gunpowder, and owing to the absence of sulphur, the danger resulting from the use of chlorate of potash in gunpowder is obviated.]

41,579.—Cooking Stove.—Zebulon Hunt, Hudson, N. Y., assignor to himself and Wm. J. Miller, Greenpoint, N. Y.:

I claim in the back flues of elevated ovens, the trough-shaped fluepiece, A, combined with the projection, C, to complete the flue, and with the damper, B, situated at the bottom of the flue, as above described.

41,580.—Safety Valve Arrangement.—Wm. S. Huntington, Andrusville, N. Y., assignor to himself and James Robertson, Alexandria, Va.:

I claim, first, The combination of the levers, C I', rods, E L M, spring pawl, K, and cam, N, operating in the described connection with the circular guide, H.

Second, I claim the combination with the spring-balance, D, of the lever, I', spring pawl, K, and notches, h, for the purpose explained.

41,581.—Machinery for finishing Cloth.—Henry James, Norwalk, Conn., assignor to himself, N. S. Seely, Stamford, Conn., and Wm. H. Seely, Brooklyn, N. Y.:

I claim the combination of the two brush cylinders, E F, the system of guide-rollers, a a b b, and the three interposed calendering rollers, the whole arranged and operating substantially as herein specified.

[This invention consists in a novel arrangement and combination of brush cylinders, calendering and embossing rollers, and guide rollers, constituting a very effective and simple machine for finishing embossing, and refinishing cloth and other fabrics.]

41,582.—Yarn Guide for Spinning Machines.—Edmund Lord (assignor to himself and Sidney Buckley), Taunton, Mass.:

I claim the improved yarn-guide as made with or having combined with its eye, a notched projection, a, arranged relatively thereto, substantially in manner and for the purpose hereinbefore specified.

And I also claim the guide as made with the notched projection, a, and with its eye-formed with the auxiliary bend, f, and in other respects substantially as represented in the accompaning drawings.

41,583.—Machine for splitting and stripping Leather.—Caleb S. Stearns (assignor to himself and Thomas Corey), Marlborough, Mass.:

I claim the combination and arrangement of the drum, B, and its grasping mechanism, the spring presser, D, and the splitting knife, C.

I also claim the combination and arrangement of the drum, B, and its grasping mechanism, the spring presser, D, the knife, C, the auxiliary knife or guide shear, G, the two rollers, E F, and the series of knives, H H, the whole being substantially as described.

I also claim the arrangement of the knives, H H, with respect to the rollers, E F, so as not only to extend between the rollers, but into grooves in each, in manner substantially as specified, whereby the knives, besides being supported by the rollers, have their cutting edges brought close up to the bite of the rollers.

41,584.—Lasting Tack.—Luther F. Thayer, Randolph, Mass., assignor to Wm. Faxon, North Bridgewater, Mass.:

I claim the improved lasting tack, as made with its head round or curved and having flat sides arranged with respect to the same in manner substantially as described.

41,585.—Rock-breaking Machine.—James B. Wayne (asssignor to himself and Henry M. Rodinson), Detroit, Mich.:

I claim, first, The use of a separate lowering-down cam, b, Fig. 1, substantially as described, for lowering down the clutch, C.

Second, I claim the link, d', Fig. 1, or its equivalent in connection with the sleeve, C,, one end pressing against the die, h, in an upward direction and the other end fitted with a pin, d'', resting on cushions, g' g', of india-rubber or their equivalent and pulling against the sleeve, C', thereby avoiding any outward or breaking strain on sleeve, C', but producing an inward pressure at each end of link, d', substantially as described.

Third, I claim the use of roller, E, Fig. 1, in connection with link, d', and lowering-down cam, b, thereby destroying the tendency to friction as is the case in working against a flat surface as in use now.

Fourth, I claim the use of an inclined guide, f, Fig. 5, thereby allowing the rod or stem, i Fig. 1, to move on its axis at every upward motion of the same by action of cam, A, substantially as described.

Fifth, I claim the use of a corrugated die, h, Fig. 6, in connection with sleeve, C', and link, d, Fig. 1, substantially as described.

41,586.—Steam Engine.—Robert D. Wright (assignor to himself and L. B. Holland), St. Louis, Mo.:

I claim, first, The combination and arrangement of the cylinder, A, piston-head, I, pipes, g g' h h' k k', and valve, e, all being constructed and adjusted to operate substantially as herein described for the purposes set forth.

Second, I claim operating pumps constructed as herein described, by means of reciprocating steam cylinders, having direct attachments to the water cylinders, and being thereby arranged to operate as and for the purposes set forth.

41,587.—Game Cards.—Cyrus W. Saladee, Paducah, Ky.:

I claim, first, The combination of a number or letter with an emblem of the designation of the various denominations of playing cards, substantially as herein specified.

Second, Placing the device for designating the card in a corner or margin of the card, for the purposes herein specified.

RE-ISSUE.

1,616.—Sewing Machine.—C. S. Patterson, E. Pincus, A. Hart, M. Moore, A. Mitchell & H. H. Reed (assignees of E. A. Goodes & E. L. Meller), Philadelphia, Pa. Patented July 26, 1859:

We claim, first, The loop-catcher or needle, b, so constructed, so arranged on a sewing machine, and having such a motion imparted to it that it will hold a loop of thread, and convey the same from the underside of the fabric and across the edge of the same as set forth.

Second, The combination of the needle or loop-catcher, b, the eye-pointed needle, n, and the hook, h, or its equivalent, the whole being arranged for joint action, substantially as and for the purpose set forth.

Third, The combination of the eye-pointed needle, n, the needle or loop-catcher, b, the hook, h, and tongue, L.

NOTE.—In the above list of claims we recognize the names of FORTY-ONE patentees whose specifications and drawings were prepared at the Scientific American Patent Agency.

The Patent Laws, enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners, except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms. Foreigners cannot secure their inventions by filing a caveat; to citizens only is this privilege accorded.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The Government fee for a caveat is $10. A pamphlet of advice regarding applications for patents and caveats is furnished gratis, on application by mail. Address MUNN & CO., No. 37 Park Row New York.

EXTENSION OF PATENTS.

Many valuable patents are annually expiring which might readily be extended, and if extended, might prove the source of wealth to their fortunate possessors. Messrs. MUNN & CO. are persuaded that very many patents are suffered to expire without any effort at extension, owing to want of proper information on the part of the patentees, their relatives or assigns, as to the law and the mode of procedure in order to obtain a renewed grant. Some of the most valuable grants now existing are *extended patents*. Patentees, or, if deceased, their heirs, may apply for the extension of patents, but should give ninety days' notice of their intention.

Patents may be extended and preliminary advice obtained, by consulting or writing to MUNN & CO., No. 37 Park Row, New York.

REJECTED APPLICATIONS.

Messrs. MUNN & CO. are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of their Washington Agency to the Patent Office affords them rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Their success in the prosecution of rejected cases has been very great. The principal portion of their charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted, are invited to correspond with MUNN & CO., on the subject, giving a brief history of the case, inclosing the official letters, &c.

FOREIGN PATENTS.

Messrs. MUNN & CO., are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business they have offices at Nos. 66 Chancery lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. They think they can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through their agency.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through MUNN & CO'S Agency, the requirements of different Government Patent Offices, &c., may be had, gratis, upon application at the principal office, No. 37 Park Row, New York, or any of the branch offices.

SEARCHES OF THE RECORDS.

Having access to all the official records at Washington, pertaining to the sale and transfer of patents, MESSRS. MUNN & CO., are at all times ready to make examinations as to titles, ownership, or assignments of patents. Fees moderate.

INVITATION TO INVENTORS.

Inventors who come to New York should not fail to pay a visit to the extensive offices of MUNN & CO. They will find a large collection of models (several hundred) of various inventions, which will afford them much interest. The whole establishment is one of great interest to inventors, and is undoubtedly the most spacious and best arranged in the world.

MUNN & CO. wish it to be distinctly understood that they do not speculate or traffic in patents, under any circumstances; but that they devote their whole time and energies to the interests of their clients.

COPIES OF PATENT CLAIMS.

MESSRS. MUNN & CO., having access to all the patents granted since the rebuilding of the Patent Office, after the fire of 1836, can furnish the claims of any patent granted since that date, for $1.

THE VALIDITY OF PATENTS.

Persons who are about purchasing patent property, or patentees who are about erecting extensive works for manufacturing under their patents, should have their claims examined carefully by competent attorneys, to see if they are not likely to infringe some existing patent, before making large investments. Written opinions on the validity of patents, after careful examination into the facts, can be had for a reasonable remuneration. The price for such services is always settled upon in advance, after knowing the nature of the invention and being informed of the points on which an opinion is solicited. For further particulars address MUNN & CO., No. 37 Park Row, New York.

ASSIGNMENTS OF PATENTS.

The assignment of patents, and agreements between patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park Row, New York.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with patent property or inventions to call at our extensive offices, No. 37 Park Row, New York, where any questions regarding the Rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid) should be addressed to MUNN & CO. No. 37 Park Row, New York.

TO OUR READERS.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and enclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired.

MODELS are required to accompany applications for Patents under the new law, the same as formerly, except on design patents, when two good drawings are all that are required to accompany the petition, specification and oath, except the Government fee.

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona-fide* acknowledgement of our reception of their funds.

Binding the "Scientific American."

It is important that all works of reference should be well bound. The SCIENTIFIC AMERICAN being the only publication in the country which records the doings of the United States Patent Office, it is preserved by a large class of its patrons, lawyers and others, for reference. Some complaints have been made that our past mode of binding in cloth is not serviceable, and a wish has been expressed that we would adopt the style of binding used on the old series, *i. e.*, heavy board sides covered with marble paper, and morocco backs and corners.

Believing that the latter style of binding will better please a large portion of our readers, we commenced on the expiration of Volume VII., to bind the sheets sent to us for the purpose in heavy board sides, covered with marble paper and leather backs and corners.

The price of binding in the above style is 75 cents. We shall be unable hereafter to furnish covers to the trade, but will be happy to receive orders for binding at the publication office, No. 37 Park Row, New York.

Back Numbers and Volumes of the "Scientific American."

VOLUMES I., III., IV., V., VII. VIII. AND IX., (NEW SERIES) complete (bound) may be had at this office and from periodical dealers. Price, bound, $2 25 per volume, by mail, $3—which includes postage. Every mechanic, inventor or artisan in the United States should have a complete set of this publication for reference. Subscribers should not fail to preserve their numbers for binding. VOLS. II. and VI. are out of print and cannot be supplied. We are unable to supply any of the first six numbers of the current volume. Therefore all new subscriptions will begin hereafter with the time the money is received.

Notes and Queries

C. A. S., of Maine.—The term "mesne-assignment," which sometimes appears in connection with the issue of Patents, signifies only that the present holder of the thing in question—for instance the person to whom a patent is granted—has become such holder not by an assignment direct from the first owner of all, as for example, the inventor, but by a transfer from some person who received it from some other individual, who received it from the original owner. There may be any number of these intermediate holders and still the term "mesne" would be employed. To illustrate:—If A assigns to B, then B, is not a holder by "mesne-assignment," but a holder by direct assignment. But if A assign to B, and B to C, then C is a holder by "mesne-assignment." Hence "mesne" is substantially defined by the word "intermediate." The former word is a mere technical term of the law.

D. B., of Conn.—If you have allowed any one to make more noise in the world or secure more fame for the suggestion of the plans you speak of, it must be your own fault. You should blow your trumpet louder. If it is only six years since you proposed the use of compressed air for driving machinery, then you are far from being the first to propound that scheme. The idea is probably half a century old. As for the use of water-power for light mechanical purposes, in cities, it must be ten years or so, since we witnessed the driving of the printing press of the *Traveller* newspaper, in Boston, by water drawn from the street pipes. The idea of using the water-power of the falls of Niagara is also very old. We fear that you have not been a constant reader of the SCIENTIFIC AMERICAN for the past fifteen years, else you would hardly give yourself the credit of being the first originator of the ancient projects which you enumerate.

S. R. K., of Mich.—If you hold the patent on a dredge for a certain county, no person has a right to use, or sell, or manufacture the machine, within your territory, without your consent.

J. F., of N. Y.—Address H. C. Baird, 406 Walnut street, Philadelphia, for a work on the subject mentioned.

E. F., of Wis.—There is much difference of opinion as to the durability of diamonds for dressing mill-stones; some stating that they are quite durable; others that they are quite useless. We are unable to inform you more positively.

O. B. F., of Ill.—By the empirical rule in use, your engine of 11-inch cylinder, and 4-feet stroke, running at the rate of 400 feet per minute, piston speed, with a pressure of 50 pounds to the square inch would give 50-horse power. A boiler for an engine of this size would require 750 square feet of heating surface, which you may dispose in the most ingenious way you can to obtain the full benefit of the fuel. Use gage-cocks and a glass water tube indicator on your boiler.

J. D. of Conn.—We have had similar complaints about syphons and air collecting in them, from others. The solution mentioned by you, in your letter, is correct, but we cannot tell you how to remedy the evil so as to prevent its recurrence.

J. A. Mc N., of Mich.—We cannot direct you to a manufacturer of small castings of iron tinned or galvanized with zinc. Such castings can, no doubt, be obtained, but we know not where.

J. C. J., of Mass.—We do not know what you mean by "self boiler-feeders," if you mean a self-acting arrangement for feeding boilers, we answer that we do not know of any operated by the expansion and contraction of brass pipes. Self-acting or automatic boiler-feeders are not much used, as the circumstances under which water should be supplied vary so much that discretion must be used, and this no machine possesses. We cannot comply with your modest request to write you concerning all the latest improvements in apparatus of this kind.

Money Received.

At the Scientific American Office, on account of Patent Office business, from Wednesday, Feb. 10, 1864, to Wednesday, Feb. 17, 1864:—

L. H., of N. Y., $25; A. G., of N. Y., $25; W. D., of N. Y., $30; W. S., of N. Y., $16; W. F. R., of N. Y., $20; J. S. L., of N. Y., $44; J. A. E., of N. J., $45; H. & McN., of N. J., $20; E. D. W., of N. Y., $82; D. M., of N. Y., $16; T. A. McC., of N. Y., $30; J. VanD., of Mich., $30; H. W. McK., of N. Y., $16; F. W. D., of N. Y., $41; C. T. B., of N. Y., $16; W. H. B., of Ill., $50; W. & A., of N. Y., $159; F. R., of Conn., $32; W. F., of Mass., $55; A. P., of Pa., $16; T. B., of Mass., $16; D. D. G., of Wis., $15; T. H. S., of U. S. A., $20; J. W. H., of N. Y., $15; J. W., of Mass., $20; E. D. E., of Ind., $159; W. P., of Iowa, $15; A. A. S., of Iowa, $16; A. H. W., of Mich., $16; S. F. W., of Iowa, $16; F. B., of Ill., $26; K. P. K., of Vt., $25; W. C. B., of Cal., $20; G. B. B., of Ind., $25; M. & B., of N. Y., $25; A. B., of N. J., $30; W. N., of N. Y., $25; G. T. T., of N. J., $16; R. R. C., of N. Y., $41; T. U., of N. Y., $10; W. H., of Wis., $20; W. B. & St J., of N. Y., $46; W. D., of N. Y., $16; L. W., of Conn., $22; C. H. H., of N. Y., $45; S. & S., of N. Y., $20; F. N., of N. Y., $16; W. C. S., of N. Y., $16; J. & D., of N. Y., $20; O. W., of N. Y., $16; J. A. H., of Vt., $16; O. R. B., of N. Y., $159; G. S., of Pa., $25; W. W., of N. Y., $16; J. H., of Pa., $15; A. J. M., of N. Y., $10; G. E. H., of Maine, $16; W. B., of Mass., $16; H. & R., of Pa., $12; W. A. B., of Vt., $16; R. W. A., of Mich., $15; F. R. W., of Ill., $15; J. G., of Minn., $12; S. T. W., of N. J., $16; T. D. R., of N. Y., $25; B. L., of Mich., $16; F. S., of Pa., $16; G. R. H. of Mo., $25; E. C. H., of N. H., $48; H. G. E., of N. Y., $16; D. S. S., of Ind., $20; S. W. P., of Mass., $20; S. & C., of N. Y., $16; T. J. T., of Md., $20; J. H. K., of N. Y., $16; F. H. B., of N. Y., $56; W. B., of N. Y., $16; J. H., of Ill., $20; B. G. M., of N. Y., $44; D. A. G., of N. Y., $22; M. V. C., of Mass., $25; T. F. B., of N. Y., $16; W. & J., of N. H., $25; N. L., of N. J., $22; S. & B., of Ill., $326; W. C. H., of Ohio, $25; J. T. R., of N. J., $16; T. L. W., of Wis., $16; E. E., of Ill., $16; B. & H., of N. J., $25; S. W., of N. J., $41; D. P., of R. I., $15; W. & T., of Conn., $25; F. G., of Mich., $25; J. W. O., of Ill., $15; A. W G., of Mass., $25; S. J. M., of N. Y., $560; F. J. T., of Conn., $16.

Persons having remitted money to this office will please to examine the above list to see that their initials appear in it and if they have not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, stating the amount and how it was sent, whether by mail or express.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office, from Wednesday, Feb. 10, 1864, to Wednesday Feb. 17, 1864:—L. H. of N. Y.; M. & B. of N. Y.; A. G. of N. Y.; E. D. W. of N. Y. (2 cases); W. B. & St. John, of N. Y.; F. W. D. of N. Y.; H. W. of N. Y.; W. N. of N. Y.; W. D. of N. Y.; G. S. L. of N. Y.; W. B. & St. J. of N. Y.; E. D. W. of N. Y. (2 cases); L. W. of N. Y.; F. H. B. of N. Y.; F. W. D. of N. Y.; B. G. M. of N. Y.; A. W. G. of Mass.; K. P. K. of Vt.; W. C. H. of O.; H. & R. of Pa.; J. G. of Minn.; F. G. of Mich.; B. H. of N. J.; J. W. of Mass.; J. P. of N. Y.; G. S. of Pa.; W. & J. of N. H.; W. L. of Md. (2 cases); S. A. T. of O.; W. & T. of Conn.; F. B. of Ill.; W. N. B. of Iowa; N. L. of N. J.; T. D. R. of N. Y.; G. B. B. of Ind.; G. R. H. of Mo.

DEPARTMENT OF AGRICULTURE,
WASHINGTON, D. C., Dec. 15, 1863.

To the Growers and Manufacturers of Flax and Hemp :

THE COMMISSIONERS APPOINTED BY THIS DEpartment, consisting of Hon. J. K. Morehead, of Pennsylvania, William M. Bailey, of Rhode Island, and John A Warder, of Ohio, to consider the following appropriation made by the last Congress, viz. :

"For investigations to test the practicability of cultivating and preparing flax and hemp as a substitute for cotton, twenty thousand dollars."

Having met, and after several days' investigation, believing that a further and fuller notice of their investigations might produce valuable results, adjourned to meet again on Wednesday the 24th day of February next, at 12 o'clock, M.

They request all interested in the distribution of this appropriation, or anxious to develop the subject for the public good, to send to this Department, on or before that day, samples of the hemp and flax in the different stages of preparation; of the fibers and fabrics prepared by them, accompanied by statements of the various processes used, and the cost of production in each case; also, descriptions of the kind and cost of machinery used, where made, &c., together with any and all information that may be useful to the Commission.

This information is necessary before an intelligent distribution of the appropriation can be made. ISAAC NEWTON.

1 9 Commissioner.

Improved Hand-stamp.

The accompanying engraving represents a new construction of a hand-stamp and stamp-canceller designed for printing, cancelling, and other uses. The advantage of this new stamp consists in that it is self-inking. The ink used with it was invented for this special purpose; it has great durability, and is always ready for use; it is not mere color smeared on a ribbon, but genuine ink—the same as is used for printing this paper. In other articles of this kind it is customary to press the stamp on a pad for a supply of ink—and afterwards on the letter. In the hurry of mailing, the stamp is not always properly inked, as the stamps on most letters will show.

With this new device the arrangement is entirely novel; the ink, prepared in pulp, is contained in a

ROGERS'S PATENT "RESERVOIR" HAND-STAMP.

fountain or reservoir inside of the stamp, and a simple pressure of the hand is all that is required to give a perfect impression on any surface. The saving of time, as well as the greater accuracy of printing by such a process is evident, as also its superior neatness in printing and clearness, for when not in use it may be carried in the pocket without danger of soiling the clothes. One charge of the ink is sufficient for thousands of impressions; and it is not affected by climate or time—it will be as good when five years old as when new, and it can be prepared of any desired color. This device may be used with the greatest rapidity; impressions being obtained from it at the rate of one hundred per minute, with a guarantee of correctness, which for Post-Office use is a desideratum long sought for. Stamps are imperfectly cancelled by the old method, and this is taken advantage of by many rogues who recover the partly defaced stamps for a second usage. It is claimed that this cannot occur with this stamp, as the ink-mark is ineradicable. The mechanical construction is simple. The ink A is contained in the tube B, and is of a semi-solid or pulpy nature; the piston C rests on this ink and pressure is communicated to it through the rod D, and knob E; the piston rod is larger in one part and the shoulder of the larger portion rests against a shoulder inside the body of the handle, so that it only rises to a certain hight. As pressure is communicated to the knob by the hand, the ink is forced down through the slits of the stamp and so printed on the letter; as the ink becomes reduced in quantity, the lower half, F, of the tube B is screwed up on the upper part, so that the ink is entirely consumed before renewal is necessary. Some of these stamps are made without the knob at the top, the simple action of impressing the stamp on paper being all that is required to force the ink out. New charges of ink may be inserted by simply unscrewing the bottom half of the tube B; the connection of these two parts not being easy to show clearly, we have not attempted it. Any pattern or any device may be substituted for the mere check-mark herewith engraved, and as a convenient apparatus for printing labels or trade-marks this hand-stamp is unrivalled. The principle is capable of much modification. This stamp is the invention of Richard H. Rogers, and was patented through the Scientific American Patent Agency, on Dec. 8, 1863; and a patent is now pending on the ink, through the same source. For further information address the inventor at No. 10 Spruce street, New York.

The Earth's Temperature in Palæozoic Times.

A very beautiful hypothesis has been framed by Mr. Sterry Hunt, F.R.S., to account for the increased temperature of the earth's surface in former geologic times. Adopting Professor Tyndall's views on the subject of absorption of heat, he shows that during palæozoic times the presence of large quantities of carbonic acid in the atmosphere was sufficient to prevent the radiation from the earth of the heat derived from the sun, and thus to increase the temperature of our planet. Dr. Tyndall has shown that heat, from whatever source, passes through oxygen, hydrogen, and nitrogen gasses, or through dry air with nearly the same facility as through a vacuum. Like rock-salt they allow of the transmission of heat; glass, however, and certain other substances, although allowing heat to travel through them from luminous bodies, prevent its radiation from non-luminous ones. There are some gasses which also possess this property; thus the absorption of heat from a body at a temperature of 212 Fahr. is by vacuum 0, that by dry air 1, that by carbonic acid gas 90, that by marsh gas 403, that by olefiant gas 970, and that by ammonia 1195. So long as the earth is surrouded by a stratum of vapor, so long will radiation from it be retarded; but during long nights the radiation into space causes the precipitation of a large quantity of this watery vapor, and so the protective shield is lost. However, we have every reason to believe that during the earlier geological periods, all that carbonic acid which we now have in our various limestones, and as carbon in our coal formations, was distributed through the atmosphere. This having been the case, it is evident that the quantity of heat radiated from the earth during these epochs must have been vastly less than that which passes away in our times; hence the temperature must also have been considerably higher, thus explaining why a vegetation like that of the tropics once existed within the frigid zones. In fact, the carbonic acid surrounded the earth like a huge protecting dome of glass.—*Canadian Naturalist and Geologist*

MR. N. F. NEWELL of Whitinsville, Mass., wishes to correspond with parties who weld steel on malleable or wrought iron, as is done with tailors' shears, vice jaws, anvil faces, and similar articles.

Extensive Adoption of the French System of Weights and Measures.

At the regular meeting of the Society of Arts in London, on Wednesday, January 27, 1864, Samuel Brown, F. S. S., Vice-President of the Institution of Actuaries, read a paper giving the best history of the metric system that we have seen. In this paper, Mr. Brown stated that the metric system was introduced in France fully in 1840, in Belgium in 1836, in Holland in 1819, in Spain in 1859, in Portugal in 1862, in Greece in 1836, and in Chili in 1848. It has long been in operation in Sardinia and Lombardy, and is now rapidly spreading over the rest of Italy. Active efforts are also being made for its introduction into Germany, Sweden, Norway, and Denmark, and there is a good prospect that these efforts will be successful. The paper concludes by strongly recommending the adoption of the system in England.

A CHILD was recently severely poisoned in western Ohio, by swallowing percussion caps such as are used on guns; by skillful medical treatment its life was saved. These articles contain a most active poison, and should be kept out of the way of children.

FROM THE STEAM PRESS OF JOHN A. GRAY & GREEN.